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Table of Contents

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LISTERIAN ORATION— PAGE.

"Capillary Endothelium," by H. H. WOOLLARD .. 134

ORIGINAL ARTICLES—

"Ultra-violet Radiation," by J. BELL FERGUSON, M.D., M.R.C.P., D.P.H. 140

"Double Lesions," by M. P. SUSMAN, M.B., Ch.M., F.R.C.S. 144

"Herniotomy in Old and Infirm People," by ROY HUCKELL 145

REPORTS OF CASES—

"Unusual Case of Dengue Fever," by REG. E. NOWLAND, M.C., M.B. 148

REVIEWS—

The Care of the Hair 148

LEADING ARTICLES—

Occupational Therapy 149

CURRENT COMMENT—

Hypercholesterolæmia and Splenomegaly 150

ABSTRACTS FROM CURRENT MEDICAL LITERATURE— PAGE.

Surgery 152

BRITISH MEDICAL ASSOCIATION NEWS—

Scientific 154

OBITUARY—

William Arthur James 158

TRANSMISSION OF BACTERIOLOGICAL AND PATHOLOGICAL SPECIMENS BY POST .. 159

BOOKS RECEIVED 160

DIARY FOR THE MONTH 160

MEDICAL APPOINTMENTS 160

MEDICAL APPOINTMENTS VACANT, ETC. 160

MEDICAL APPOINTMENTS: IMPORTANT NOTICE 160

EDITORIAL NOTICES 160

Listerian Oration.[1]

CAPILLARY ENDOTHELIUM.

By H. H. WOOLLARD,
Professor of Anatomy, University of Adelaide.

MAY I express my very great appreciation of the honour you have done me in asking me to speak to you on this occasion.

As a laboratory worker I am not directly in touch with the results of Lister's achievement, but no one can escape knowing that his true memorial is the unlimited activity of modern surgery. Modern surgery is founded on the solution of three great problems: (i) the healing of wounds by first intention, (ii) the invention of a safe, reliable and innocent anæsthetic and (iii) the prevention of surgical shock. All three had been virtually solved in prewar civil practice, but the terrible injuries inflicted during the war made necessary certain modifications in the Listerian technique and concentrated attention on secondary wound shock.

Among the many subjects Lister investigated, one of the earliest and one in which in later life he thought his work had not been sufficiently recognized, was the behaviour of the minute blood vessels. Lister's fame in finding the solution of the first problem—the problem of infection—has led us to forget his contribution to the third problem, namely, that of shock. It not only made us forget his contribution to this particular problem, but has led us to forget the work of all the surgeon anatomists. For since the time of Vesalius anatomy has produced two types of investigators. One concerned himself with the search for the prototype of all animal organization by morphological comparison, a method which culminated in the theory of evolution; this aspect of the subject is still the predominant interest of anatomists. The other type was the surgeon anatomist, of whom the great Hunter and Lister himself and in this day Cushing, are splendid examples. There are now and there always have been surgeons such as these who go to anatomy to find out the structure of the tissue and how it works. All good surgeons belong to this type and now the fruit of Lister's work has been gathered, they will return to the traditions of these men more and more.

It is just one of the common paradoxes of events that Lister should have led us to forget the surgeon anatomist type of investigator so splendidly illustrated in himself.

Between 1853 and 1857 Lister published a number of papers dealing with the structure of minute blood vessels and their reactions to mechanical, thermal and chemical stimuli. His biographer records how Lister pursued these researches until the early hours of the morning and that his wife wrote down his observations. Rickman Godlee says that her handwriting never faltered, no matter what the hour of the night and the night was more often the morning; he further remarks that when the pen fell from her dead hand, the work of recording was taken up by her sister. Memorial lectures to the wife of Lister would not be inappropriate. Success in research depends on many incalculable factors.

These researches on the vascular system led Lister to consider the phenomena of inflammation and finally to the putrefactive theory of inflammation owing to the presence of microorganisms. It was the brilliant vindication of these later results that led us to forget their origin and even to forget the whole race of surgeon anatomists. It was really the war that renewed interest in capillaries, for out of precisely similar investigations in which the experiments of Lister were repeated, the elucidation, at any rate in part, of the surgical problem of shock has come.

It is for these reasons, their bearing on shock, their derivation from the work of Lister and finally because some of my own work bears on the subject, that I have chosen the consideration of capillary endothelium.

Structure of Capillaries.

Let me briefly recall the main facts about the structure of capillaries. Harvey in 1628 predicted their existence. They were actually demonstrated by Malpighi in 1661. Lister observed that the terminal arteries were invested by a single layer of smooth muscle fibres wound spirally around these vessels. From the arterioles the arterial capillaries issue consisting of only a single layer of endothelial cells and these in turn open into the venous capillaries of similar structure. Later work has shown that in certain organs the venous capillaries are often wide spaces and are then called sinusoids. These finally open into the venules. In 1851 Beale discovered that the capillaries, at any rate in part, were accompanied by non-medullated nerve fibres. In 1873 Rouget described certain cells with irregular bodies and spidery processes related to the capillaries which have since been known by his name. Most recently there has come an appreciation of their innate properties of contraction and dilatation and a replacement of the idea of merely a passive rôle in circulation and blood pressure by a belief in their active contribution to these vital events.

Continuity of Endothelium.

The first point to which I would direct your attention is the development of endothelium. Endothelium specifically refers to the cells lining vascular or lymphatic channels. Though we usually talk about the endothelium of the peritoneum, the pleura, the cerebro-spinal spaces *et cetera*, yet, strictly speaking, the name mesothelium should be reserved for these, for we know that cells lining these spaces have a different origin and their cells different functions from the endothelial cells of

[1] Delivered at a meeting of the South Australian Branch of the British Medical Association on May 31, 1928.

vascular and lymphatic systems. Recent investigation has finally shown that the whole body is a series of closed spaces. In the tissues we have the so-called tissue spaces. These form a closed series continuous neither with the lymphatic spaces nor with the vascular system. Similarly, the peritoneal spaces, the pleural space, and the cerebro-spinal space are closed spaces. Interchange between these various systems can occur only by first traversing of a layer of mesothelium and a layer of endothelium. Cellular barriers, possessing selective absorption and the properties of semipermeable membranes, have to be reckoned with everywhere. The vascular system is on the whole a closed one. It is true the lymphatic system finally joins it, but even here the connexion is indirect. The duct usually forms a large number of small branches before entering the subclavian vein just before this meets the internal jugular. The vascular elements of the blood do not enter the lymphatic fluid, for an examination of the thoracic duct will reveal only an occasional red corpuscle. It has long been contended that the blood becomes extravascular in certain places, as in the spleen and also that in the bone marrow red cells, developed extravascularly, can enter the blood stream since the endothelium is deficient there. The details of the vascular arrangements still require further investigation in the spleen. Recently Sabin and her coworkers have shown that the red cells of the blood are actually formed intravascularly in the bone marrow in what are in reality collapsed capillaries. Thus there has been a change from the earlier notion of the body as a series of intercommunicating spaces to the idea that the body consists of a series of closed cavities. This idea is confirmed by embryology. The cœlom arises from the delamination of two layers of mesenchyme. The cerebro-spinal space is a fusion of tissue spaces. The lymphatics begin partly as vascular sprouts and partly by the fusion of preformed spaces in the mesoblastic tissue of the body. The vascular channels begin in two ways. It was originally taught that all blood vessels began outside the embryo in the extraembryonic tissues. But we now know that in addition to this extraembryonic origin certain mesenchyme cells arrange themselves parallel to one another and thus form a sort of capillary bed in the embryo. This intraembryonic bed unites with the extraembryonic and so there is formed a complete series of vascular channels for the whole embryo inside and outside.

All-pervading Capillary Plexus.

It is an interesting fact that all the channels of the circulatory system are formed in this way. That is, all vessels first begin as a capillary bed. This has been shown to be true for all parts of the aorta, even for the heart itself. In fact, the only exceptions known are the dorsal segmental branches of the aorta. These really appear to be sprouts. Anatomy books suggest that all vessels appear to be the result of sprouting, but in reality there is always a complete capillary bed. This embraces at first the whole embryo. The transformation of this bed into definitive vessels is the result of the metabolic demands of the tissues. The arterial stem in the beginning always occupies a central axial position in the growing structure. Its displacement is a secondary process. Its structural changes and the formation of its coats are a response to the hæmodynamic demands—the quantity of blood to be delivered, the rate at which it flows. Since the demands are usually the same, we expect, and there usually is, a definite vascular pattern. However, it is easy to see that fluctuations can easily arise and in fact often do. The vascular pattern, when compared with the nervous for instance, is singularly inconstant. The illustrations of these phenomena were drawn as they occur, for example, in the laying down of the vessels of the forelimb, from injections that I made of very minute pig embryos.[1] The first (an embryo of 4·5 millimetres) shows the capillary bed and a series of segmental vessels equally contributing to that capillary bed. Then follow a withering of the proximal and distal serial vessels and the predominance of the central one. Soon there arises a reticular formation in the main capillary bed and a main central vessel with a ventral and dorsal distribution in the terminal part of the limb appears. And so the changes go on in obedience to mechanical laws. The veins behave in an analogous fashion and form a symmetrical marginal system.

Therefore, given the capillaries, the rest of the development of the circulatory system occurs in response to hæmodynamic laws and, if the demands of the growing tissue were known, the pattern could be predicted. It follows that by altering the tissue demand a new vascular pattern could be established and this can be shown to be the case experimentally. The main vessel by operations on one part of the capillary bed can be forced to arise and enlarge from some other part. A further illustration of this mechanical law is seen in the observation of Hunter. The calibre of a blood vessel varies inversely as the angle of its origin from the main stem. The segmental branches of the aorta compared with the internal and external carotids are good examples.

When we pursue the inquiry in the opposite direction and inquire how the capillary bed is formed, all we can say is that certain primordial cells, the common mesenchyme cells, the forerunners of all the cells of the mesodermal tissues, assume a definite form, arrange themselves in such a way that they form a channel and so we get a capillary. At the moment we have no knowledge whatever of the forces that cause certain of the mesenchymal cells to behave in this fashion. The primitive mesenchymal cell transforms itself into what we call an angioblast cell. The angioblast has the power of forming the endothelial wall of the capillary, but it has not yet lost other potencies, for the first red blood corpuscles are not only formed from mesen-

[1] Professor Woollard showed some lantern slides to illustrate these remarks.

chyme cells, but also from angioblastic cells which are already acting as endothelial cells. The same cells multiply, form blood islands and in some of these cells droplets of fluid accumulate in their cytoplasm. This fluid increases and then ruptures beyond the confines of the cell and so the blood plasma is formed. Blood plasma is formed as an intracellular secretion. Though we regard it as a body fluid which, so to speak, is always present, yet it is formed in the beginning as cellular secretion. It is probable that all through life its essential constituents are added to it directly or indirectly in the same way. In many ways it is analogous to the formation of the cerebro-spinal fluid.

The Macrophage.

I do not wish to enter into the whole vexed question of the formation of the cellular elements of the blood, but one other aspect demands mention. Ehrlich's original classification of the blood has been revised by recent work. He classified the white cells of the blood into two main varieties, the granular and the non-granular. The non-granular he divided into large and small lymphocytes. The large lymphocyte, including Ehrlich's transitional cell, is now known to be a specific kind of cell. It is essentially identical with a cell found in the tissues and known by a variety of names. In the blood this old large lymphocyte is called a monocyte and in the tissues a histiocyte or clasmatocyte or more simply, a macrophage. The point is, however, that these two cells are the same. They are both amœboid, both phagocytic. Their identification was made possible by vital dyes and to these they behave in precisely the same manner. Moreover, both are derived from the primitive angioblast in the beginning and their names depend on whether they inhabit the blood stream or the tissues. In later life they still preserve this origin from endothelium and are proliferated normally and under experimental conditions from the endothelium in certain definite places, namely, the liver, spleen and bone marrow. Another source for them is the reticulum of organs like the lymphatic glands. Reticulum is now known to be a special tissue in its chemical composition, in its resistance to ferments and to hydrolytic agents. We have reason to believe that it is a more primitive tissue and that its cells retain some of the potencies of the primordial mesenchyme cell and can, under certain conditions, form blood cells or macrophages or reticular fibrous tissue. The behaviour of the endothelium in certain places and the similar behaviour of the reticular cells when stimulated by the injection of the vital dyes, led Aschoff to propose the name of reticulo-endothelial system for these cells. The priority of this conception really belongs to Evans, who gathered the system together under the name of the macrophage system.

Thus endothelium preserves in certain areas the powers which in the beginning are the property of all endothelial cells. These particular areas are restricted in later life to where the arteriolar capillaries open into wide-spaced venous sinuses and are the very areas where endothelium has been supposed to be deficient. The most recent work of Warren Lewis indicates that the endothelial cells of this system can form fibroblasts and thus secrete fibrous tissue; they are the source of epithelioid and giant cells, the source of defensive cells, immune bodies, bile pigments and possibly other substances. Normally they destroy the effete red blood corpuscles. On the pathological side there is reason to believe this system plays a part in a great number of diseases, such as splenomegaly, hypercholesterolæmia, pernicious anæmia *et cetera* and in the cellular reactions in tuberculosis, typhoid fever, Hodgkin's disease and inflammatory processes generally.

Rouget Cells.

On the other hand, cells with supposedly other functions are being added to this system. The recent discovery that capillaries can contract and dilate has led to the search for a mechanism by means of which these events can be brought about. Such a mechanism was thought to be found in the cells of Rouget. These are large cells with numerous processes capable of altering their shape and, since they are disposed about the capillaries, their alteration in shape was thought to be the basis of capillary contraction. Vimtrup's figures have often been used to illustrate this purpose. However, Clarke has shown that contractility occurs in capillaries before Rouget cells are apparent and that it may begin at points where these cells are absent. Further, he has observed that these cells are amœboid and wander away from the capillaries. Krogh supposed that each of these cells was innervated by a terminal branch of a sympathetic nerve fibre. Investigation shows that Rouget cells have a variable relation to nerve fibres and that capillaries contract when no such cells are present. Contractility is a property of all cells and is apparently still possessed by the capillary endothelium.

These same cells have again been supposed to be nerve cells. If we define a nerve cell as one possessing neurofibrillæ and Nissl granules, then this thesis cannot be maintained. In normal preparations where they lie in the nerve net, then the idea is very reasonable; but if the nerve net be removed by degeneration, then these cells are left high and dry and the net disappears from all round them. The Rouget cell reacts to vital dyes and is believed now to form one more cell member of the reticulo-endothelial system.

In general we can say that endothelium of the body consists of two kinds, one specialized, able to contract and dilate and form new capillaries; a second, retaining the original potencies of derivation, contributing to the cells of the blood and by proliferation contributing to the formation of the reticulo-endothelial system.

The Specialized Endothelium.

Turning now to the second part and more specialized area of the capillaries, we find that though here the endothelium has lost its primordial

potencies, it shows many variations. The factor that dominates the form of this part of the capillary bed, is its relation to the metabolic needs of the tissue. The form of the capillaries in the tongue or the skin is vastly different from the broad capillaries of the lung with their tenuous walls. The number of capillaries in a given mass of tissue, say a muscle for instance, shows considerable variation in different animals. When the muscle of a cold-blooded animal like the frog is compared with the dog for instance, the number of capillaries per unit mass is very much greater in the latter. Again, there is a considerable difference in the number of capillaries in the different organs of the same animal. This can be shown very prettily by injecting India ink into the vessels. Those organs with an abundant capillary bed will appear black, while those with a scantier bed will assume a less intense colour. Thus the brain and the liver appear black, while resting muscles such as the tongue for instance, will appear grey. Active muscles like the heart become intensely black.

The difference between resting muscle and active muscle is interesting, for this difference rests on the presence of a potential capillary bed in muscles, part of which comes into action only when the muscle is in action. The capillary bed of muscle was discovered by Krogh to undergo such an increase that the number of capillaries in an active muscle was four times as great as in a resting muscle. This potentiality of expansion of the capillary bed applies only to organs whose activity is subject to great fluctuation. The capillary bed of the brain, of the heart and apparently of the skin also, has a constant number of capillaries in action all the time.

Reactions of the Specialized Endothelium.

This specialized portion of the capillary bed is capable of certain responses when stimulated. If the stimulus be mild, as drawing a blunt ruler gently across the skin, a contraction of the capillaries will ensue along this line. By means of an oil with an appropriate refractive index, such as cedar oil or Canada balsam, and oblique illumination, the actual constriction of the capillaries can be observed under the microscope and its limitation to the capillaries made certain. If the ruler be drawn more violently the capillaries dilate and a red flush with local increase of temperature ensues and again by the same means the reaction can be observed to be a capillary one. If the nerves to the area be intact, the flush will radiate for a distance from the stimulated line. Along with the dilatation there occurs an increase in the permeability of the endothelium of the capillaries and fluid exudes into the tissues producing an œdema or a wheal. The latter phenomenon can be shown very nicely by raising a blister with oil mustard after injecting a dye such as neutral red or trypan blue into the circulation. The dye will colour the exudate. That the permeability is a limited change in the endothelium is shown by the fact that only particles of relatively small size will pass through the cell. The particles of India ink, for instance, cannot permeate the endothelial wall under these conditions. Again, capillaries in general will constrict in the presence of adrenalin; while histamine, when injected, constricts the arterioles, but dilates the capillaries. Here again there are variations. The action of adrenalin on the lung capillaries remains uncertain, while it dilates those of the heart. The capillaries of the brain are extremely interesting. We have already mentioned that the capillary bed is constant and Florey has recently shown that these capillaries will react in the usual manner to mechanical, electrical and thermal stimuli. However, there is no radiation of the reaction from the site of the stimulation. Only the capillaries directly stimulated respond. Heat and cold will affect the capillary bed only so far as these stimuli themselves can extend, a point of some clinical interest. Moreover, Florey was unable to obtain any response to adrenalin. The substance was without any effect on the lumen of the capillaries. Just recently my friend Lee, of Johns Hopkins, in a very careful series of experiments was quite unable to obtain any response to histamine. In the body the regulation of the blood flow and the responses of the circulation are profoundly modified by physical considerations. The blood flow of the brain and bone marrow occurs within a rigid box, or in physiological language, within a rigid plethysmograph. Such areas appear to have under normal conditions a constant capillary bed and a constant blood flow and the capillary endothelium has to function under conditions which inhibit chemical responses.

Innervation of Blood Vessels.

If we consider the arterial and venous system of the trunk, we are struck by the ease with which a plexus of sympathetic nerves can be demonstrated in association with the great blood vessels. When, however, we look at the limb vessels, no such plexus is seen. When Leriche introduced his operation of vascular sympathectomy it was received with caution in England, though vigorously taken up in France and America. The quick publication of disappointing results confirmed the caution of British surgeons. They were not persuaded of its validity, since for them it had no secure anatomical basis. I tried to put the matter to the test of experiment and proceeded to denervate the vessels of the extremities in two ways, first by removing the sympathetic chain along the abdomen and secondly by removing the adventitial coat and surrounding tissues from the aorta to the femoral along the iliac arteries. Actual dissection aided by the binocular microscope can show the existence of small nerve threads in the adventitia of such arteries as the subclavian and the iliacs, continuous with the plexuses of the aorta. But these are very fine threads and experiment shows that they can furnish fibres for only a small portion of the axial arteries of the limbs. Beyond the middle of the thigh region the arteries receive an abundant nerve supply from the adjacent nerve trunks. These systems together form a continuous nerve net in the

media of the blood vessels, but conduction in this net meets with a high resistance and its propagation along the vessel soon peters out. This high resistance has been demonstrated experimentally.

The nerve supply of the medium and smaller arteries and arterioles is of a double kind. One set of fibres belongs to the sympathetic system, as is proved by degeneration experiments. This system forms a fine non-medullated plexus in the middle coat of the vessels. Though still a matter of controversy, I believe that these fine fibres do not actually terminate in the substance of the smooth muscle cells. The other system belongs to the cerebro-spinal system, is medullated and forms more or less complicated endings which lie between the adventitial and middle coats.

Another point that can be observed, is that the same fibre which forms this ending on the blood vessel, often gives off a collateral branch which can be traced far away into the surrounding tissue where it again ends in diffuse fine branches or in a more organized form like a Pacinian corpuscle. Beyond the arterioles, in the region of the minute vessels, only one of these systems continues, namely, the sympathetic. These can be traced usually as fine non-medullated fibres in pairs lying on either side of the capillary, often joined by transverse communications. Again, no form of ending appears. They simply grow finer and finer until they pass beyond the limits of vision. The cerebro-spinal system does not contribute to this innervation. This balanced relation of the two systems seems a general law of the vascular system as a whole. In the heart the medullated system reaches a high degree of organization in the distribution and complicated endings of the depressor nerve. These extend all over the auricle, around the orifices of the great veins, along the ascending aorta and its arch and even about the roots of the great vessels. The vagal and sympathetic systems exhibit a reciprocal relation to the arterioles and capillaries, for both are found on the larger vessels, while the area of minute vessels appears experimentally to belong predominantly to the vagus.

In the brain the anatomical facts are still in dispute. My own investigations suggest that the innervation is entirely sympathetic, but the fibres are few, do not extend beyond the basal vessels, do not form the rich plexuses in the media and do not extend to the capillary bed.

Explanation of the Action of Capillaries.

The Nervous Reflexes.

I do not intend to discuss the central vasomotor reflexes, for our knowledge of these is very far from complete. If the central end of a divided nerve like the sciatic be stimulated, then if the mode of stimulation be by slow stimuli, say two a second, a reflex vasodilatation results. If, however, the stimuli be more frequent or, if slow, be made more powerful, then vasoconstriction results. The results appear to depend on the impulse volume of the stimuli. The pressor and depressor paths follow different routes in the spinal cord. Such reflexes are distinguished from the ordinary spinal reflexes, say the propioceptive, by not being distinctly localized, by the absence of reciprocal innervation and the like. Moreover, we do not know what central parts are involved. There are spinal centres, medullary centres, possibly higher centres, but their situation is disputed. By Karplus and Kreidl the principal centre has been located in the region of the *tuber cinereum*, by others in the basal ganglia and so on. However, there is now convincing demonstration of the reality of the vasomotor axon reflex. The anatomical basis of the reflex is now known and its existence under various conditions in man has been abundantly demonstrated by Sir Thomas Lewis. It depends on the integrity of the peripheral nerves and disappears when these have degenerated. It is responsible for the spread and radiation of peripheral reactions and its disappearance in man after degeneration of the nerves excludes the local existence of nerve cells.

Chemical Theory.

We have already seen that the arrangement of the innervation of vessels makes it difficult to understand how these nerves exert their influence if we confine ourselves to the notions derived from the method of cerebro-spinal innervation. There is no direct connexion discoverable by anatomical methods between the nerve termination and the executor apparatus. We have already referred to the situation of the endings of all parts of the vasomotor apparatus.

For a long time the action of drugs, the relation of adrenalin and pituitary secretion to the unstriped muscle of the body, has reinforced the idea agreeable on other grounds, such as the antiquity and primordial nature of the system, that the vasomotor system might be operated by special secretions of the body. The actual demonstration of such a hypothesis has been recently achieved. Though our knowledge is yet incomplete and there are still gaps and difficulties, yet there are many reasons for believing in a humoral theory of vasomotor reflexes.

The most recent investigation pointing in this direction is that of Sir Thomas Lewis. He made an analysis of the behaviour of the skin capillaries, controlling his investigations by direct observation with the microscope. He has shown beyond all doubt the validity of the axon reflex. The radiation of the capillary dilatation beyond the point of stimulation, the flare as he calls it, depends on the integrity of the nerves and disappears when these have had time to degenerate. Next he showed that the dilatation, the permeability and the œdema could be paralleled in every way by histamine. Finally, in denervated subjects, the fluid of the œdema could reproduce the same responses in other parts of the body. He therefore concluded that the reactions of the capillaries depended on a substance liberated in the tissues which he called a histamine-like substance.

There are other striking observations, perhaps less well known, which lead in the same direction. They are impressive and have been amply confirmed. Loewi so arranged his experiments that he was able to stimulate the vagus to a heart that was being perfused. When the washings of such a heart were collected and injected into a second animal, at once all the vagal effects were reproduced in this second heart. The same kind of experiment was carried out in which the sympathetic was stimulated instead of the vagus. The second heart now reproduced the effects of sympathetic stimulation. Thus there could be no escape from the conclusion that stimulation of the vagus or the sympathetic produced some chemical substance in the tissues of the heart which occasioned all the usual vagal or sympathetic effects. As further confirmation of this view is the fact that, when the perfused fluid was collected and injected into the gastric vessels, then all the effects of vagal stimulation were reproduced in the stomach.

The work of Bayliss and Dale carried this humoral theory into the region of such conditions as that of surgical shock. Beginning with histamine, which at first seemed merely a pharmacological curiosity, Dale found that the injection of this substance reproduced all the phenomena of shock. The patient had bled into his own capillaries. The phenomena of wound shock did not appear in the investigations of Bayliss if the mangled limb was excluded from the general circulation. Indeed we can now believe that the local reactions of capillaries represent the normal, a small controlled reaction to substances produced locally in the skin, for instance, while surgical shock represents a reaction of the whole organism to the massive production of such substances and because of its excessive nature it becomes a problem of great surgical importance. The validity of these views is supported by the experience of surgeons who soon saw the good effects of the removal of damaged tissues. Whether the actual substance produced in the tissues is the drug histamine or not is still uncertain. Its close relation to histamine, an aminoacid abundant in protein, suggests that this may be so. Histidine becomes histamine by the removal of carbon dioxide.

Interaction of Constrictor and Dilator Substances.

Whether we are actually dealing in these local and general reactions with histamine or with a histamine-like body remains uncertain. On the other hand, we may believe the constrictor agent is adrenalin. There is some evidence which leads us to believe that there is a reciprocal relation between the two agents. Gaskell long ago observed that stimulating a muscle nerve always produced vasodilatation. These metabolites when released into the general circulation bring about increased heart action. Cannon has shown recently that the general effect of such metabolites in increasing the activity of the heart occurs only when the suprarenal is present. If this organ is ablated, the secondary effect on the heart does not appear. Dale produced some evidence to show that there was a reciprocal action between dilator substance and constrictor substances in the body. Injections of adrenalin lead to release of dilator substances and these latter to the release of adrenalin. However, I believe Dale has since offered another explanation of the observations on which this interpretation was based.

The clinical applications of these facts will not be new to you. They offer a good explanation of secondary wound shock and suggest the propriety of speedy removal of damaged tissue. The anaphylactic reaction probably may be similarly explained and Lewis has taken in a particular case a dilute solution of the protein to which the subject was sensitive, and showed that when this was punctured into the skin, the histamine-like effects were there reproduced. The explanation may be extended to the reactions of exposure to ultra-violet light and the general effects of burns of the body.

For the constrictor apparatus we are furnished with an apparatus in the chromaffin tissues of the body. This system is much more extensive than is usually supposed. It includes not only the medulla of the suprarenal, the *glomus coccygeum*, the *glomus caroticum*, the organs of Zuckerkandl, but probably is found in other situations. In the amphibia chromaffin tissue is found in all the dorsal root ganglia. Tandler records that it has been found in the auriculo-ventricular sulcus of the heart. Recent work carries the pituitary up into the floor of the third ventricle in the *pars tuberalis*. As a speculation it is possible that such pigmented organs as the *substantia nigra* and the iron-bearing cells of the *globus pallidus* may be included in this or some related chemical mechanism.

In regard to a vasodilator organ the tendency has been to look upon all metabolites as a possible source. However, I suggest that there may be a special tissue for these dilator substances, namely, the Rouget cells of the reticulo-endothelial system. I have referred to the anomalous behaviour of the brain capillaries. When experimenting with the effect of dyes on the central nervous system, I found it was possible to get them into the central nervous system in only two ways: either by giving such a massive dose that the animal was poisoned and died of convulsions, or if moderate doses were used, they had to be given intrathecally. Thus there is guarding the portals of the central nervous system an effective agent for keeping out the unwanted substances and the organs which deal with these substances, the reticulo-endothelium system, are absent. The next point that is of bearing on the subject, is the recent experimental demonstration that the membranes of the brain are not of mesodermal origin as has been believed until now, but are derived from the ectoderm of the neural crest. In a brilliant series of investigations Harrison showed that the nerve cells of the dorsal ganglia, the sympathetic nerve cells, the medullary sheath of the nerves and finally the neurilemma were all derived from the neural crest. The latest extension of this system is to show that the membranes of the brain are derived from the same tissue. Being ectodermal in origin, it follows

that the brain contains no cells of the reticulo-endothelial system. Thus the Rouget cell is absent there and there is no organ present for the formation of our chemical control of the capillaries. Had they responded directly to adrenalin and histamine, the idea might indeed appear well founded. Since they do not, the matter must remain a speculation pending investigation. In general it can be said that in considering the behaviour of capillary, we must take into account two kinds of nerves, two kinds of endothelium, two kinds of chemical substances and the interaction of these with one another. If Lady Lister had demurred at the futility of a young surgeon wasting his time on the behaviour of the minute blood vessels in the frog's web no one could have blamed her. We are, however, now in a position to realize partially, in a dim sort of way, how much anatomy, physiology, pathology, medicine and surgery hang upon those investigations of minute blood vessels initiated by the immortal Lister.

ULTRA-VIOLET RADIATION.[1]

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THE application of any form of radiant energy to disease must eventually come within the province of the general practitioner in medicine. It is to be regretted that at the present time the practical application of ultra-violet radiation is left mostly to the unqualified person and members of the medical profession as a whole have not made themselves familiar with a most powerful source of energy which will help them to solve many daily problems in the treatment of disease.

In a country like Australia, with its abundance of sunshine, the remark is often heard that "artificial sunlight" as it is called, is not required, as there is a plentiful supply of natural sunlight for all. This is, like most half-truths, a most misleading statement and a few minutes' investigation of the physics of ultra-violet light will dispel this idea.

PHYSICS OF ULTRA-VIOLET RADIATION.

As far back as 1666, Newton discovered the spectrum of visible light. In 1777 Scheele demonstrated the invisible rays beyond the violet. Modern theories regard radiation as a propagation of energy in the form of waves. These waves have been shown to vary continuously in length from 20,000 to 30,000 metres at the wireless region of the electro-magnetic waves, to the extremely short vibrations involved in radium emanations. These waves travel at a uniform velocity of 299,460 kilometres (186,000 miles) per second; the speed of light is 30,000 million centimetres per second.

[1] Address to Eastern Suburbs Subdivision of Victorian Branch, British Medical Association, May 30, 1928.

Measurement.

A purely arbitrary unit of measurement has been adopted for measuring and calculating the wave lengths of visible and invisible light, the Ångström unit, usually designated as "Å." One Ångström unit equals one ten-millionth of a millimetre. A chart of electro-magnetic waves may be imagined as composed of sixty-two octaves, divided as follows. Starting from one end we have:

1. Very long waves, including Hertzian waves and wireless waves .. .. 28 octaves
2. Infra-red waves .. .. 9 octaves
3. Visible rays—light (red to violet) 1 octave
4. Ultra-violet rays (invisible) .. .. 5 octaves
5. X rays .. .. 14 octaves
6. Radium emanations .. .. 3 octaves
7. Millikan ray, recently discovered and of which little is known.

Considerable variations in power of penetration occur as we proceed from 1 to 7.

The following wave lengths are important and should be memorized in ultra-violet work: Visible light covers the region from 7,000 Ångström units down to 4,000 Ångström units, while ultra-violet rays extend from 4,000 Ångström units to 1,850 Ångström units for practical purposes. Below that figure they fail to penetrate air and are of academic interest only. The term "artificial sunlight" is a very bad one, for we get no ultra-violet radiation from the sun below 2,950 Ångström units even on a high mountain on a bright day. Ultra-violet rays include short, medium and long, the latter only being obtained from the sun. The maximum biological action of ultra-violet light appears to be obtained from waves between 2,400 Ångström units and 2,700 Ångström units, so artificial sources of ultra-violet radiation act mostly with wave lengths shorter than 3,000 Ångström units and the sun with rays mostly longer than 3,000 Ångström units. It will be seen from the above facts that the term "artificial sunlight" is a bad one and that the idea that natural sunlight can be utilized in the treatment of disease as successfully as "artificial" is incorrect.

Natural sunlight contains only about 1% of ultra-violet rays, light rays and a large percentage of heat rays which may be harmful and cause difficulty during treatment.

Rollier, of Leysin, has said "Sun and ultra-violet rays bear much the same relation to one another as crude drugs to their synthetically prepared chemical substitutes."

One hears much about infra-red rays which are simply heat rays, and which can be obtained from very familiar sources, such as the hot water bottle or the radiator.

Visible light waves penetrate and warm the blood, may increase lymph circulation and do not produce burn or erythema.

Infra-red rays penetrate the tissues, warm the skin, cause sweating and may produce a burn, but give ample warning.

Ultra-violet rays do not penetrate (the longer ultra-violet radiation waves penetrate about one-tenth of a millimetre of skin) and are bactericidal to surface organisms. They give no warning, but can produce a burn after a latent period of six or eight hours.

TYPES OF APPARATUS BEST SUITED TO GENERAL PRACTICE.

A bewildering array of lamps which provide a service of ultra-violet radiation is available, but these lamps fall into two main categories—those in which electrodes of carbon, metal such as tungsten or cored carbons are used, and quartz mercury vapour lamps. For practice and from the point of view of cost of running, ease of manipulation and reliability, the quartz mercury vapour lamp is the best choice. These lamps are made in two main types: (i) Vacuum burner type, (ii) atmospheric burner type.

The former can be used with alternating current if a double positive poled burner is used, but they are fragile.

The latter are more robust and more generally reliable. They require direct current and, if alternating current only is available, some form of converter must be used.

Lamps are designed for general treatment and others specially for local treatment of body cavities *et cetera*.

Every ultra-violet ray lamp of the quartz mercury vapour type should be checked for output of ultra-violet radiation say once a month, by the use of an actinometer.

The most generally useful actinometer at present available is King's "Carbon Tetra Chloride Actinometer," in which carbon tetrachloride is exposed in a quartz tube at fifteen centimetres (six inches) from the burner for three minutes. A drop of 10% potassium iodide solution is added, the tube is shaken and the resulting red colour compared with standard tints. The deeper the colour, the stronger the lamp in use. Carbon tetrachloride picks out a wave length between 2,400 and 2,650 Ångström units, which is considered to be a "vital" region in the ultra-violet spectrum for purposes of treatment.

Goggles for patients and operator must be obtained and care taken to see that they are properly adjusted. Slight leakage of light or reflected ultra-violet radiation from walls *et cetera* will produce a severe and painful conjunctivitis, even after a very few moments' exposure.

Sheets of tissue paper serve to protect areas surrounding the part under treatment and an interval-timer with alarm completes the necessary equipment.

USE OF ULTRA-VIOLET RADIATION IN GENERAL PRACTICE.

Dosage.

When commencing ultra-violet radiation work, it is wise to test the reaction of each patient's skin to the rays. This is most conveniently done by stretching over the upper part of the arm or the abdomen a sheet of cloth or other material with four diamond-shaped openings 2·5 centimetres by 2·5 centimetres (one inch by one inch), with covering flaps. These are exposed to the lamp at a given distance, say fifty centimetres (20 inches).

At the end of two minutes the first opening is covered. At the end of four minutes the second is covered and so on. Thus we have four small areas which have received in order two, four, six and eight minutes' exposure at fifty centimetres. Inspection of these areas next day will enable the physician to judge exactly the time and distance he requires to produce a given effect.

Reaction on Skin.

"Erythema reactions" on the skin appear in six to eight hours. They are roughly divided into:

Reaction of first degree, faint blush on the skin.

Reaction of second degree, blush followed by slight powdering.

Reaction of third degree, definite erythema with some œdema, followed by desquamation.

Reaction of fourth degree, very definite erythema with blisters and much œdema and followed by profuse and repeated desquamation.

Dosage may be divided into: (i) sedative doses, (ii) tonic doses, (iii) counter-irritant doses. In the first type of dose very mild doses are applied with avoidance of any skin action. In the second type mild erythema may be employed over the body, with sometimes more definite erythema over localized areas. In the third type counter-irritant doses vary from moderate erythema to a blistering burn over limited areas.

Contraindications.

The chief contraindication to the use of ultra-violet radiation is the presence of progressive and febrile pulmonary tuberculosis, especially in those cases with massive infiltration undergoing softening. In such circumstances ultra-violet radiation is almost lethal. In afebrile patients, however, and those whose hæmoptysis is accompanied by evidence of fibrosis, careful irradiation produces good results and does not aggravate the hæmoptysis.

The second contraindication is hypopiesia. Persistent low blood pressure readings usually indicate very small initial doses. If this point is not watched carefully, such patients feel ill after irradiation.

In the third place certain sensitive individuals appear to have an idiosyncracy to ultra-violet radiation and complain of lassitude, headache and fatigue, often with drowsiness during the day and insomnia at night. These persons often have a low blood pressure. If given sub-minimal doses, they usually respond to treatment well.

In the fourth place certain skin conditions react unfavourably, especially some forms of acute eczema and certain bullous eruptions. In these conditions or when doubt exists, a trial patch may be irradiated.

The last contraindication is in patients with myocarditis, when asthenia is present and compensation has failed.

It will be seen from the above that absolute contraindications are few and that adjustment of dosage is indicated rather than cessation of treatment.

Home treatment by the patient is to be deprecated and is dangerous, unless the doctor sees that a screen of Chances's "vita glass" is affixed to the lamp, so that the short and more active rays are largely cut off, leaving the longer waves, which more nearly approximate to those of sunlight.

It is impracticable here to enter fully into the types of disease which may be dealt with by ultra-violet radiation, but I may add a few remarks which may serve as a rough guide to choice of initial cases in practice.

Constitutional Diseases and Diseases of Metabolism.

Rickets.

In rickets the value of ultra-violet radiation surpasses that of cod liver oil and the prophylactic use of ultra-violet radiation could practically banish rickets from a community. The action of the rays here is interesting and has been worked out recently.

Cholesterol was at first thought to be the key and it was believed that this substance became anti-rhachitic on irradiation by sunlight or ultra-violet radiation from an artificial source, due to production of Vitamin *D*. Rosenheim and Webster, however, have found that Vitamin *D* is produced from ergosterol—a sterol found in minute amounts in cholesterol (one in 2,000). Its potency is of the order that one ten-thousandth part of a milligramme of irradiated ergosterol, given to a rat on a rickets-producing diet, will entirely prevent rickets. It is now on the market under various proprietary names, but this substance is unlikely to supplant ultra-violet radiation in the treatment of rickets.

General irradiation of the body is given several times a week in rickets, care being taken to avoid any erythema. With infants and young children as a rule, two to four minutes at one hundred and twenty centimetres (forty-eight inches) is sufficient to the back and front of the body.

Tetany and Spasmophilia.

Tetany and spasmophilia are not common, but respond rapidly to treatment. Ultra-violet radiation acts by raising the blood calcium to normal level.

"Debility."

In ante-natal cases of debility benefit results. The restlessness often met with is relieved, insomnia banished and hyperpiesis often relieved. The patient's mental state is often influenced for the better and her outlook becomes more cheerful. In post-natal debility considerable benefit is seen and in many cases of imperfect lactation test feeds reveal a definitely improved secretion.

The weedy debilitated toddler or school child provides a problem for the harassed family doctor which is sometimes difficult to solve, and in quite a large number of these patients ultra-violet radiation seems to give the metabolism just the stimulus it requires.

Diseases of the Skin.

Much has been written about the effects of irradiation in alopecia. There is no doubt that ultra-violet radiation will stop the falling hair and is probably the best known agent for the stimulation of new hair growth. At the same time, in old standing alopecia, the period for treatment required is very prolonged and the results do not justify the time expended. If patients are seen early, then good results may be obtained in from three to six months. Strong reactions must be produced once a week over the affected areas.

Results are good in *acne vulgaris* as a rule, but a few cases are obstinate, when the X rays are of great help. This applies also to psoriasis.

The old "I.C.T." of army days is often seen, especially amongst children of the poor and yields rapidly to irradiation. Furunculosis, chilblains, prurigenous conditions, erysipelas and many forms of urticaria respond well.

In eczema severe reaction in acute cases must be avoided, whereas in chronic cases definite reactions should be produced. Various forms of dermatitis heal rapidly, including trade dermatitis such as that due to formalin, bakers' dermatitis and that due to cocoa, phosphorus *et cetera*.

If *herpes zoster* patients are taken very early I have the impression that certain cases may be aborted. When the lesion is established the action of ultra-violet radiation in removing pain is remarkable. A definite erythema should be secured.

Lupus and scrofuloderma respond well, but the treatment is prolonged. General irradiation of the body every week and the production of a fourth degree reaction over small patches once a fortnight are desirable.

Varicose ulcers heal well, provided, as with other forms of treatment, the patient will undertake the necessary rest. At first, third degree reactions should be given for six millimetres (one-quarter inch) round the ulcer. As the ulcer heals, protect the fine granulations with green protective and give gentle sedative doses, together with general irradiation to the body.

Warts and keloid scars yield to fourth degree reactions (blistering burns) repeated at intervals. Treatment here is prolonged.

Ringworm of the body is rapidly cured after strong irradiation. On the scalp it is more resistant.

Ultra-violet radiation is most useful in diagnosis. An oxide of nickel (Woods's) glass is placed over the aperture of the lamp to cut off visible light, when any affected hairs on the scalp will be seen to stand out with a greenish fluorescence in a darkened room. (This filtered ray may be of medico-legal use to police surgeons, in certain cases, for seminal stains, even ten years old, will fluoresce brilliantly and show up on clothing, where in ordinary light they are invisible).

The surgeon seems to have neglected ultra-violet radiation, but he will find much help from the rays in sterilizing skin areas before operation, in securing pliable scars with good cosmetic result, in

treating injuries of occupation and in the management of burns, both heat and chemical and in securing good union for fractures.

Heat burns, scorch and scald, do well and a good cosmetic result is secured with small daily doses, half normal erythema, that is half the test dose which gives a mild erythema.

Chemical burns heal well with ultra-violet radiation; it acts as an analgesic, bactericide and tissue stimulant. Avoid ointments in burns and use picric lotion.

Diseases of the Nervous System.

In the chorea of school children the period of rest from school may be considerably shortened by irradiation and a definite improvement in the child's nervous state results.

Neuritis of various types proves a bugbear to the practitioner and in these cases ultra-violet light rarely fails to secure relief and freedom from attacks.

In brachial neuritis and sciatic neuritis results are particularly good. Also some cases of trigeminal neuralgia give good results. Here give definite erythema reactions over the course and distribution of the nerve every week, with general body irradiation in addition. A series of twelve general irradiations twice a week will often produce definite improvement in neurasthenic and emotional states, probably through improvement in the calcium metabolism.

Diseases of the Respiratory System.

The best results in the respiratory system are found in cases of unresolved pneumonia and in some forms of bronchitis, after whooping cough or measles. Benefit is seen in *laryngismus stridulus* and attacks appear to be warded off. In bronchitis and asthma a number of patients obtain relief, but results are not uniform.

In whooping cough excellent results are obtained and much praise for the treatment is forthcoming from that severest of critics, the grandmother, whose experience of this disease often exceeds that of the doctor.

The "common cold" presents a problem. Here the correct dose is a very critical one and the physician may readily augment the cold instead of curing it. On another occasion he will appear to have aborted the coryzal attack completely.

Local treatment for throat and nose disease requires special forms of apparatus which the specialist in ultra-violet radiation will possess.

Rheumatism and Allied Diseases.

Most satisfactory results are to be expected and obtained in the treatment of conditions such as lumbago, sciatica of rheumatic origin and panniculitis. In the latter condition careful massage is of further benefit. In myalgias of obscure origin relief is often secured. In subacute rheumatic fever there is reason to believe that careful and prolonged treatment will stop the "niggling" action of the poison on the cardiac valves and act as a definite preventive of chronic heart disease in later life.

In rheumatoid arthritis and osteoarthritis, pain is relieved in most cases to some extent and definite improvement occurs in a few.

Tuberculosis.

Ultra-violet radiation acts well in skin tuberculosis, in bone and joint tuberculosis, in mesenteric tuberculosis and in tuberculous adenitis and more or less in the order given. Treatment must be prolonged, but the results are well worth the time and energy expended.

In lung tuberculosis, as stated above, acute, progressive and febrile lesions with softening are a definite contraindication. On the other hand, afebrile patients and those with fibrosis respond well to radiation, provided great care is exercised in dosage and the treatment carefully supervised.

Some scheme such as is shown in the accompanying table must be worked out for each patient

TABLE SHOWING SCHEME OF ULTRA-VIOLET RADIATION TREATMENT IN TUBERCULOSIS.

Day.	Time in Minutes.[1]					
	Face.	Arms.	Legs.	Buttocks.	Abdomen.	Trunk.
1st	3	1	1	—	—	—
3rd	3	2	1	—	—	—
5th	4	3	2	1	—	—
7th	5	4	3	2	—	—
9th	5	5	4	3	2	1
11th	5	5	5	4	3	2
13th	5	5	5	5	4	3
15th	5	5	5	5	5	4

[1] The distance of the patient from the burner is ninety centimetres (three feet).

Treatment is continued on these lines with a maximum of about five minutes back and front at ninety centimetres (thirty-six inches) and reducing doses to twice a week. Smaller initial doses may be required and the intervals adjusted to suit each case.

In conclusion, ultra-violet radiation produces certain definite effects:

1. It increases the bactericidal power of the blood.
2. It has a direct bactericidal effect on surface organisms.
3. It has a detoxicating effect in certain toxins.
4. It increases retention in the body of calcium, phosphorus and iron.
5. It stimulates metabolism in suitable doses or depresses it in overdoses.
6. It has an analgesic effect on the skin.
7. It can be used very exactly as a counter-irritant and rubefacient.
8. It has a definite general tonic effect, especially in convalescence after debilitating diseases.
9. While ultra-violet radiation has been known for over a century, it is only comparatively recently that its wide application and therapeutic possibilities have begun to be employed. Sufficient solid evidence of its utility in many fields of medicine is available to indicate its use in the practice of every modern physician.

DOUBLE LESIONS.

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And be these juggling fiends no more believed
That palter with us in a double sense.
Macbeth, Act V, Scene 7.

DISEASE, a witch as treacherous as any of the juggling fiends that hoodwinked Macbeth, sometimes attacks us in two guises. In our medical puberty we are warned against diagnosing two diseases in the one patient; the mere recitation of definite isolated exceptions serves the useful purpose of correcting a generalization which is apt to be repeated automatically by a succession of teachers.

There are scattered references to double lesions in the literature.

De Quervain[1] describes the case of an old man brought to hospital with a large strangulated inguinal hernia. Tension and tenderness of the abdomen seemed very unusual for a comparatively recent strangulation. At operation the hernia contained adherent masses of omentum showing fat necrosis secondary to pancreatitis.

Burrows[2] discusses several examples: A young woman was seized with acute abdominal pain; on examination a large tender swelling was found in the pelvis. At operation a twisted ovarian cyst was removed; but, alas, at autopsy a perforated duodenal ulcer was discovered.

A middle-aged man complained of post-prandial pain and one attack of hæmatemesis; radiograms revealed a gastric ulcer. One day he collapsed with sudden acute abdominal pain and vomited. The provisional diagnosis was perforation of the ulcer; at operation two chronic ulcers were found on the lesser curvature of the stomach and also a duodenal ulcer, but none of them had perforated. There was some turbid odourless fluid, but no gas in the abdomen. The appendix was found to be infiltrated with carcinoma, the pelvis was full of pus and a carcinomatous mass occupied the rectum. The growth could be felt *per anum*, but this supremely important examination had been omitted before operation.

A young boy was seized with acute pain in the right groin and scrotum, so severe that torsion of the testis was considered. In reality he had diffuse peritonitis from acute appendicitis as well as a congenital hernial sac which subsequently suppurated.

Lockwood[3] quotes a case in which, owing to the recognized presence of plumbism, a gangrenous appendix was overlooked with disastrous results.

An anonymous writer[4] reports the case of a woman, aged seventy-three, who complained of abdominal pain, vomiting and constipation. The abdomen was distended, but not tender. There was an irreducible umbilical hernia which was considered to be strangulated; it contained adherent omentum and small gut, but there was no evidence of strangulation. On further investigation flakes of lymph were seen and the appendix was found to be perforated.

Within a period of two years I have personally encountered the following examples of double lesions.

Perforated Duodenal Ulcer with Tabes Dorsalis.

E.B., a male, aged forty-four years, was admitted to hospital three hours after the sudden onset of acute generalized abdominal pain. The temperature was subnormal, the pulse rate fifty per minute and the systolic and diastolic blood pressure 120 and 85 millimetres of mercury respectively. The whole abdomen was immobile, very rigid and tender; pain was mainly on the right side. The right pupil was larger than the left and neither reacted to light; the tendon reflexes were absent. He had suffered from "nerves" and indigestion for years.

At operation there was a tiny perforation in a chronic indurated duodenal ulcer; the anterior surface of the duodenum and the corresponding part of the liver were plastered with lymph. The ulcer was infolded by a Lembert suture and covered by a fold of omentum. He made an uninterrupted recovery.

He returned to hospital later with hæmatemesis and still later with progressive *tabes dorsalis*.

Volvulus of Ascending Colon with Irreducible Inguinal Hernia.

G.C., a male, aged sixty-eight years, had had for many years a right inguinal hernia, hitherto reducible. Nine hours before admission to hospital he was seized with sudden abdominal pain followed by vomiting. The hernia was tense, tender and irreducible; it extended to the bottom of the scrotum and was translucent in parts.

At operation the hernial sac contained much bloody, fæcal-smelling fluid and over a foot of moderately congested small gut; but there was no strangulation or constriction and reduction was easy.

The patient was unrelieved by the operation and died two days later.

At autopsy there was a volvulus of the ascending colon which together with the caecum and the appendix was gangrenous.

Comment.

On reviewing the case I see, with bowed head, that:

1. The presence of fæcal-smelling fluid should have suggested some gross intestinal lesion; certainly something more than the mild congestion of the small gut in the hernial sac.

2. The ease with which reduction occurred at operation made it still more likely that some other lesion was present. The irreducibility before operation is explained by the tenderness which made taxis too painful to be tolerated by the patient.

3. The inflammatory changes in the hernia that dominated the clinical picture were only secondary.

Cholecystitis and Endothelioma of Pleura and Pericardium.

E.S., a female, aged fifty-seven years, complained of pain in the right side of the abdomen and lower part of the thorax, passing round to the back. She had had one attack of jaundice. General examination revealed no abnormality except for slight fever and the presence of Murphy's sign.

At operation I removed the gall bladder which was shrunken, thick-walled and adherent to adjacent viscera. There were two small stones in the common bile duct, but none in the gall bladder.

At autopsy a small stone, not causing obstruction, was found at the lower end of the common bile duct. There was an endothelioma of the right pleura and the pericardium.

Duodenal Ulcer and Sarcoma of the Liver.

W.H., a male aged thirty-seven years, had a history of flatulence and attacks of epigastric pain for three years. He had lost 18·9 kilograms (three stone) in weight during this time, but had remained fairly well between attacks until the last six weeks during which his general health had deteriorated more rapidly. The pain was not related to food and there had been no vomiting. Several hours before admission to hospital he had been suddenly seized with generalized abdominal pain quite different from any that he had had previously. The signs found on examination were those of a frank perforation of a peptic ulcer.

At operation I closed a perforation in a moderately chronic duodenal ulcer. The liver was not enlarged, but there were three white, hard, puckered nodules on its anterior surface.

The patient left hospital six weeks after operation and was readmitted a month later; the liver was very enlarged and he had much abdominal discomfort.

At autopsy four and a half months after operation the liver was found to extend down to the pelvis and was studded with many nodules similar to those seen at operation. Microscopically, the growth was a mixed cell sarcoma. There was a chronic non-malignant ulcer in the first part of the duodenum.

Sarcoma of Scalp, Tabes Dorsalis and Duodenal Ulcer.

A.B., a male, aged fifty years, requested excision of a growth behind the left ear. For many years his right knee joint had been swollen, flail and disorganized, but not painful; he also had other obvious tabetic stigmata. Recently he had developed dyspeptic symptoms, suggestive of duodenal ulcer. The tumour behind the ear was a soft, lobulated, non-ulcerated dark mass, attached to the scalp by a broad pedicle and freely movable over the bone. It was excised. Histologically it was a round cell sarcoma. Local recurrence occurred rapidly and the patient died a few months later.

At autopsy there were widespread sarcomatous metastases in the viscera. The right knee joint showed the well-known pathological changes of a Charcot joint. A chronic peptic ulcer was found in the first part of the duodenum.

Suppurative Appendicitis and Carcinoma of the Sigmoid Colon.

E.P., a female, aged thirty-eight years, was admitted with a characteristic history of acute appendicitis. A large abscess in the right iliac fossa was opened and drained, no search being made for the appendix. Six weeks later complete intestinal obstruction developed; this was assigned to post-operative adhesions. Prompt relief followed drainage of the first piece of distended gut seen. The bowels commenced to open *per anum* three weeks later, but the intestinal fistula remained patent. Two months afterwards the appendix, swollen and œdematous but quiescent, was removed and the fistula closed. This fistula proved to be a caecal one; at the previous operation it had not been determined what part of the gut had been drained. The patient immediately showed signs of intestinal obstruction again and perished.

At autopsy there was a ring carcinoma of the sigmoid colon, completely obliterating the lumen of the gut.

Gangrenous Appendicitis and Carcinoma of the Descending Colon.

J.R., a male, aged sixty-eight years, had had a series of attacks of abdominal pain in the six weeks preceding admission to hospital; during this time he had vomited frequently and had been constipated. The last attack had started two days previously and was the worst he had ever had. He complained of pain in the lower part of the abdomen especially in the right iliac fossa and there were moderate tenderness and rigidity here; no intestinal distension was present. His general condition was poor; the tongue was dry and there were signs of collapse of the base of the right lung.

At operation offensive purulent fluid escaped on opening the abdomen. A tumour was felt in the descending colon; many metastases were seen and there was a spreading peritonitis which was attributed to perforation of the gut above the growth.

At autopsy the appendix was gangrenous *en masse* and perforated. There was an ulcerating ring carcinoma in the lower part of the descending colon; the gut above, including small intestine, was distended and inflamed but not perforated anywhere. The liver was enlarged and riddled with growth. The base of each lung was collapsed.

Comment.

The two last cases are a striking contrast: In the first one the appendicitis was found at operation and the growth at autopsy, while in the second the growth was found at operation and the appendicitis at autopsy.

Carcinoma of the Small Intestine in an Irreducible Hernia.

I have already reported a case of carcinoma of the small intestine in an irreducible hernia.[5] The growth was found in a loop of the small gut during operation done for supposed strangulation.

Paget's Disease of the Glans Penis and Visceral Syphilis.

I have also reported a case of Paget's disease of the *glans penis* and visceral syphilis.[6] The patient had advanced visceral syphilis and the lesion on the penis was at first considered to be a tertiary syphilide, but the histological appearances were diagnostic.

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(4) Anonymous: *The British Journal of Surgery*, Volume I, 1914, page 719.
(5) M. P. Susman: "Carcinoma of the Small Intestine," THE MEDICAL JOURNAL OF AUSTRALIA, April 14, 1928, page 465.
(6) M. P. Susman: "Paget's Disease of the Glans Penis," *The British Journal of Surgery*, April, 1928, page 635.

HERNIOTOMY IN OLD AND INFIRM PEOPLE.

By ROY HUCKELL,
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THERE are two surgical conditions which are very common in old men, particularly in those who for many years have suffered from chronic constipation with much straining at stool. They are inguinal hernia, generally big enough to be of the scrotal type and hæmorrhoids, complicated by a greater or less degree of prolapse of the rectal mucous membrane. These old people are often in indifferent health and are more often than not bronchial subjects with cough and expectoration and not infrequently show evidence of myocardial degeneration. The sufferers from hernia have often worn a truss for many years and in my experience the truss is either absolutely inadequate or the old infirm patient finds it a difficulty to adjust it properly and to keep it in position. Explanations are useless

and the truss is merely a delusion and a snare. Repeatedly I have seen this class of patient over a course of many years and most of them have been told that they are too old for operation or too infirm. And so a life of misery is left for them to drag out. Now this should not be so. I have done a number of these operations and have been impressed with the safety and the good results that can be obtained. No procedure earns more gratitude from those unfortunate old men who are cursed with a big scrotal hernia to add to their other infirmities. But if these operations are to be done, the surgeon must follow a definite routine and adhere to it rigidly on every occasion.

In the first place a general medical examination is made, particularly to estimate cardiac, renal and pulmonary conditions. If there is slight dyspnœa or any rhonchi are present on auscultation, it is generally advisable to give a little digitalis and carbonate of ammonia and keep the patient in bed, well propped up, for a few days. Of course, really bad heart failure or severe bronchitis, actually present, are a positive contraindication until the conditions are ameliorated, if they ever do become so.

In the second place, a few days before the proposed operation liquid paraffin is prescribed, two to four teaspoonsful night and morning; this saves much trouble with the bowels and obviates scyballa and straining.

In the third place, the night before operation the patient has a soap and water enema, the site of operation is shaved, he has a warm bath and then goes to bed. A couple of hours later the usual preparation is done.

My routine is to mop with benzine, then with methylated spirit and then paint with 4% picric acid in 75% alcohol. The parts are covered with a dry sterile towel. One hour before operation the patient is given a hypodermic injection of morphine 0·01 gramme (one-sixth of a grain) with scopolamine 0·4 milligramme (one one-hundred and fiftieth of a grain) and a half hour later morphine 0·0075 gramme (one-eighth of a grain) alone. The ears are plugged with oiled cotton wool and the eyes bandaged. The operating theatre should be carefully warmed and the table covered with two folded blankets and a single sheet. The head of the table is raised fifteen to twenty centimetres (six to eight inches) and a pillow put beneath the patient's knees. No unnecessary talking is permitted. One hundred and twenty cubic centimetres (four ounces) of freshly prepared 0·25% "Novocain" solution containing 0·6 mil (ten minims) of one in a thousand adrenalin solution and kept at the boil for five minutes are used for analgesia. The aseptic technique from start to finish must be faultless and no non-absorbable ligature nor suture used and every vessel, no matter how small, must be clamped and ligatured with fine catgut. I use nothing but chromicized gut soaked for at least four days in 1% iodine solution in spirit, in addition to the manufacturer's guarantee of internal sterility.

An ordinary hypodermic syringe with a very small sharp needle is used to make a wheal at a point about 2·5 centimetres (one inch) internal to the anterior superior iliac spine. A twenty cubic centimetre "Record" syringe armed with a sharp pointed small calibre needle about ten centimetres (four inches) long is then filled with solution. The needle is introduced painlessly through the wheal and carefully passed deeply till slight resistance shows the oblique aponeurosis has been reached. About ten cubic centimetres are injected here. This blocks the iliac branch of the ilio-hypogastric nerve. The needle is slightly withdrawn and gradually passed in the subcutaneous tissue, injecting a little ahead all the time, along the proposed line of incision towards the spine of pubes. The syringe having a push-on joint, it is unnecessary to withdraw the needle for refilling. About twenty cubic centimetres are used along this tract. It is safe to make the incision now down to the aponeurosis without waiting more than three or four minutes. Of course the areolar tissue is very œdematous, but this is no disadvantage to the surgeon who is accustomed to this appearance, and a quick incision allows escape of "Novocain" solution and diminishes any possible danger of slightly toxic absorption. The incision is best made in a curve with convexity remote from Poupart's ligament and a short flap turned down. A few touches with a very sharp scalpel readily clean down the œdematous areolar tissue and it is important that the external oblique aponeurosis be carefully cleaned from all this fatty areolar tissue and the external ring clearly defined. The small pudic and epigastric vessels are divided between clamps and ligatured. I now introduce a 12·5 centimetre (five inch) syringe needle with a short bias dull point just beneath the aponeurosis about midway between the iliac spine and the symphysis and keeping it parallel with the plane of aponeurosis, infiltrate in all directions, paying special attention to the vicinity of the external ring. This completely blocks the hypogastric branch of the ilio-hypogastric and the ilio-inguinal nerves. The external ring is defined with the knife and the aponeurosis slit up to internal ring using angle-bent scissors. The lower flap is cleaned down to Poupart's ligament. The genital branch of the genito-crural nerve may perhaps be seen on the tissues of the cord, but generally it is not seen till later and I content myself by injecting with the blunt needle one or two cubic centimetres of fluid beneath the cord and in a circular fashion around the region of the internal ring. This blocks the nerve, but one must be careful not to drag on the cord and not to eviscerate the testicle from the scrotum, both of which are quite unnecessary. I never see the testicle in these operations. With the closed blades of curved scissors the cord tissues are freed and brought up sufficiently to allow a piece of gauze to be slipped underneath it. A longitudinal slit allows the cremasteric muscular fascia to be reflected. In these cases the sac is always a big one and goes right down into the scrotum. Very often at this stage there will be

intestine or omentum inside it. They must not be pushed back, but a nurse is detailed to put the table for a few minutes into a slight Trendelenburg position and with or without a little shake of the cord, the contents of the sac slip back into the abdomen, assuming they are not adherent. The sac is then defined and opened, the proximal margins caught in two or three clamp forceps and the interior inspected to make sure there are not adherent contents. When the operator is satisfied, the sac is freed up to the internal ring, special care being taken that there is no bladder protruding on its mesial aspect, for it is just in these cases that this accident is so common. The sac is slowly twisted into a rope up to the internal ring and ligatured after transfixion. The ends of the ligature are left long, threaded on two needles, and the ends passed from within out through the internal oblique about 2·5 centimetres (one inch) above the internal ring. The two ends are then tied together. This further pulls the end of the sac up and prevents any possibility of the dreaded "dimple." If there is a big bunch of varicosity in the spermatic veins, I prefer to ligature at each end and excise them. It does not matter in these old men even if testicular atrophy does occur and it is rather important to make the bulk of the cord as small as possible. I prefer to ligature the distal (scrotal) end of the sac. Many leave it open fearing hydrocele. Personally, I think that the certainty of hæmatocele is worse than the remote possibility of hydrocele. The patient is put back into his original raised position as soon as the proximal end of the sac has been dealt with. This is important. All kinds of methods are advocated for the next step. Perhaps I have been fortunate, but my experience has always been that there is a loose big fold of internal oblique and transversalis, though sometimes the fibrous conjoined tendon is ill-developed. Everything above the inguinal canal is loose and redundant from the prolonged occupancy of the big hernia and it has seemed to me that all that is needed is a general "reefing-in" of structures with transplantation of cord. I think that any of Gallie's technique is rarely indicated and certainly these old people should not have big thigh incisions made to secure *fascia lata*, though in one or two cases of direct hernia I have used McEachern's living suture strips from the external oblique edges. Practically always I have passed three Number 3 mattress catgut sutures through the conjoined tendon medially and further out through the muscle itself, the latter sutures piercing the muscle about 2·5 centimetres (one inch) from its free border. The lower layer of the external oblique aponeurosis is pulled well out so that these sutures can be passed well into Poupart's ligament. One thread of the mattress stitch goes well into the ligament and the other a little above it, so that when the suture is tied there will be no tendency for it to cut out along the "grain" of the ligament. This also is important. All the sutures are passed before any one of them is tied. The mesial suture must pierce Poupart's ligament right against its insertion into the pubes.

The cord, of course, is held out of the way as usual. When these sutures are inserted and tied as described, the internal oblique forms a thick fold of muscle running along the course of Poupart's ligament owing to the sutures being so far placed from its edge. This also is important. Only a small exit is left above for the much reduced tissues of the cord. Mattress sutures of strong gut are now passed through the upper (or mesial) edge of the external oblique aponeurosis and the same suture then picks up by transfixion a deep bite of the rolled-up internal oblique as before described. From this the two ends of the mattress suture are passed also through Poupart's ligament from within out. Two or three others are passed similarly and only a small external ring is left for the exit of the cord. All are passed before any one is tied. This leaves now a free lower flap of aponeurosis which is reduplicated upwards and sutured to the aponeurosis beneath with a continuous suture of gut.

Four silkworm gut sutures are passed through the skin and subcutaneous tissues and just pick up the aponeurosis in their bite. They are left untied while the skin margins are whipped together with a continuous suture of iodized silk. The suture line is repainted with picric spirit and the silkworm gut tied as anchor sutures over a thick roll of wool wrapped in gauze.

They are tied by three twists and then a bow knot. This is important also, because the wool pad primarily acts as a support to the tissues and as there is more oozing after local anæsthetics, it gets very damp and in forty-eight hours it is a simple matter to undo the bow knots (ends left long), put on a fresh roll of dressing, and retie.

If any urine damps it also, it is easily redressed. I do not like collodion dressings. They dam back secretions and delay union. A little loose gauze is applied, then a square of jaconet with a hole cut through it is placed for the penis and the edge is fastened to the skin with strapping. Two 7·5 centimetre (three inch) bands of "Z.O." strapping are now applied. One takes its grip from the iliac crest on the operated side, is pulled firmly over the dressing and fastened down to the inner side of the same thigh. The other passes from the iliac crest of the opposite side and is pulled taut to the external surface of the thigh on the operated side. The patient is put into a warm bed in a warm room in a semi-sitting position with a pillow under the knees, but is allowed to turn on either side (with help) whenever he likes. He is allowed even to swing his legs over the side of the bed if urination is difficult, but of course is not allowed to stand up. Sutures are removed in ten days. A roll and bands of strapping are kept on till the end of the third week. I have seen no shock, no exhaustion; patients have a good meal on going back to bed and final results are extremely good.

I claim originality for only one or two points of this paper, but what I would emphasize is that it embodies the important points of numerous operations into a complete harmony. Not one thing alone

must be done, but every single thing, if uniform success is expected. And particularly on no account must general anæsthesia be used· it aims at the very heart of the question. As a rule there is no immediate danger from ether, but the remote effects in these cases may spell complete failure or even death.

In a later paper I hope to describe my operation for hæmorrhoids with prolapse in elderly people.

Reports of Cases.

UNUSUAL CASE OF DENGUE FEVER.

By REG. E. NOWLAND, M.C., M.B. (Sydney),
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THE following case is of interest: (i) Because the patient had an attack of dengue fever, although she had not been out of the suburbs of Sydney for months: (ii) the attack occurred in the middle of winter, when mosquitoes are practically non-existent in her neighbourhood; (iii) she lived within about two hundred yards of wharves where boats plying to the northern part of Australia and the Islands are constantly berthed, that is, from places where the disease is endemic; (iv) she remembered being bitten by a big mosquito a week or so prior to the attack. She said it was a different mosquito from what is usually found about the house. Whether this was the source of infection is hypothetical; it is, however, suggestive.

In these days of rapid transportation by air, land and water, this case has to my mind an important bearing upon public health, for it is quite conceivable and the health authorities are alert to the fact, that mosquitoes or other disease-laden insects could be easily conveyed by any of these sources and, retaining their virulence, because their journey would be comparatively short, initiate an epidemic of some foreign disease.

Clinical History.

E.M., *ætatis* twenty-three years, a female, single, a clerk, living at Balmain, had a "fainting turn" at about 8.30 a.m. on June 5, 1928. I saw her just after she recovered from the "faint." History was that she had been "off colour" for a few days, but tried to keep up. On June 4, although she was not feeling well she went ice skating and felt "very bad" afterwards, with pains and aches all over her body, severe headache and shivering. Her menstruation was regular, the last menstrual period having occurred two weeks previously. On examination she was very pale, her pulse rate was one hundred and twenty per minute and toneless. Her temperature was 37·8° C. (100° F.). Her tongue was furred and breath "heavy." Her throat was slightly congested. Her lungs were clear, but the heart sounds were weak. The abdomen was distended in the left hypochondrium; no tenderness nor rigidity was present. The knees were hot and tender to the touch, the limbs were listless; she said she could not move them because they were so weak. The urine contained a moderately heavy cloud of albumin. The reflexes were normal.

On the following day her condition was much worse. Her temperature was 39·6° C. (103·4° F.) and she was complaining of very severe pains in her back and knees, also of severe headache, the prostration was extreme and she could not life a hand to feed herself. Her tongue was thickly coated, dry and inclined to be brownish.

The following day her general condition was the same. Her stomach was dilated with a definite point of tenderness over the first part of the duodenum. She vomited everything taken by mouth, the vomitus containing streaks of blood; there was also a little bright blood in a motion she had the previous night.

Later in the day, that is, the third day from the onset, a macular erythematous rash appeared on the elbows and extensor surfaces of the arms and forearms, also on the anterior surfaces of the knees. Insomnia in spite of drugs was a prominent feature at this period. On the following day, as well as the above rash, a general erythema was distinguishable all over the body, somewhat resembling the rash of scarlet fever, though much fainter. In parts the eruption was not unlike the rash of measles. There was also a very definite macular eruption on the mucous membrane of the palate, cheek and pharynx. She started to bleed freely *per vaginam* (she had menstruated two weeks previously), had severe epistaxis lasting about eighteen hours and passed a moderate amount of blood as well as mucus in her stools. In spite of these severe hæmorrhages her general condition at no time looked desperate, her pulse was very soft and the rate averaged about 96 per minute. From now onwards her condition gradually improved, the rash lasting for a week or so.

The characteristic feature about her convalescence was the pronounced listlessness and prostration. The recurrence of acute symptoms, with rise in temperature after the initial fall was not seen in this case, though the pains in knees and back persisted for several weeks.

A blood examination was made on about the tenth day from onset. The neutrophile cells were 60%, lymphocytes 34%, mononuclear cells 4%, eosinophile cells 2%.

As the case appeared so interesting and important to me, I communicated with the Board of Health and one of the medical officers kindly came out. His suggestion was that the infecting mosquito had probably been conveyed by boat which berthed about two hundred yards from her home or by motor car, as she was employed in Wentworth Avenue, Sydney, a very busy motor car centre which is frequented by cars from all parts of Australia.

Reviews.

THE CARE OF THE HAIR.

"A TREATISE ON DISEASES OF THE HAIR AND SCALP," by Dr. S. Dana Hubbard is, according to the preface, "not intended to be an extensive treatise, but rather a carefully compiled practical digest of the subject," yet it contains five hundred pages, divided into twenty-eight chapters with an appendix.[1] The text illustrations, both coloured and black and white, are printed on excellent paper. That the author has gone very deeply into the subject of diseases of the hair and scalp is evidenced by the fact that besides his own many cases he has quoted authorities from all over the world, including Dr. McMurray, of Sydney. We hardly think it necessary to give illustrations of an ordinary hair brush and comb, at least it is not necessary for the Australian public.

The chapter on "Dressing and Curling the Hair" is evidently included for the so-called beauty specialist, but is nevertheless interesting to read in these days of the "permanent wave."

Paraphenylendiamine, the constituent of most hair dyes, is condemned and rightly so by the author who quotes that in a recent raid on hair dye manufacturers in New York City out of twenty-two samples of hair dye, eighteen contained this very dangerous drug. All offenders were summoned to court for violation of the sanitary code. Such a law to forbid its use could be well copied in Australia where many cases of dermatitis have been seen arising from this drug in the use of hair dyes and in the dyeing of the rabbit skin coat.

The writer states that his experience with radium has been limited to observing its use in the hands of others. He should have stopped there. We also wish to point out that radium is not a "drug" in the usual sense of the term.

On the whole the book which is full of repetition, may be of use to those wishing to know about the subject, but for practical purposes the fuller textbooks on dermatology of which there are many, contain all that is needed by the medical skin specialist.

[1] "A Treatise on Diseases of the Hair and Scalp," by S. Dana Hubbard, M.D.; 1928. Philadelphia: Lea and Febiger. Royal 8vo., pp. 500, with illustrations. Price: $5.50 net.

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Occupational Therapy.

DURING the latter stages of the war and in the period that followed the armistice, the subject of vocational reeducation claimed the attention of sociologists and governments. The combatant countries had problems to face that were both urgent and direct. Countless young men had entered the armies of the world ill equipped for the grim struggle for existence in civil life. Many of these young men suffered some disability as a result of their war service, either from wounds received in the field or from the psychic trauma of the terrifying experience of trench life and of modern warfare. When they returned to their home countries it became necessary to create facilities for the technical education or reeducation of these boy soldiers. Schools of vocational training were set up, at first in connexion with the orthopædic departments of the military and repatriation hospitals and later in the established technical colleges. Physicians and surgeons soon discovered afresh that occupation of the mind and exercise of the body constituted valuable therapeutic measures which shortened the period of incapacity and enhanced the chances of complete recovery. In addition the fact that the occupational therapy embodied the plan of providing the victims with a suitable calling, lent weight to the measure and rendered the results doubly valuable.

The experience gained in this manner was not wasted. In ordinary life a healthy individual is usually trained to follow some vocation. The leisured class is dying out, not only because competition is becoming more and more acute, but also because mental and physical health is unattainable without constant occupation. Work of some kind is necessary for a nation; a community of lazy individuals is not worthy of consideration. In civil life it is recognized that even those who are handicapped by some physical defect, can be trained to become useful citizens, if adequate vocational training is carried out. At the second session of the Australasian Medical Congress (British Medical Association) in Dunedin the subject of the training of cripples in war and in peace was discussed and the importance of physical exercise and vocational training was given due recognition. The lot of the blind and the deaf and dumb and even of the blind, deaf and dumb has been ameliorated by the instrument of work. Orthopædic surgeons have learned that the function of a partially paralysed limb can be revived by the application of judiciously planned exercises. The interest and sympathy of the whole community have been awakened in favour of the cripple and the victim of physical defects. Institutions, aid societies and funds have been established in various countries to further this movement and to lighten the burden of the deformed members of the community. While this has been spurred and helped by popular support, little notice has been taken of the parlous condition of those psychic cripples who are quite unfitted to engage in life's battles as a result of some developmental defect of the mind or of certain diseases of the nervous system. It has long been recognized that mentally deficient children, whose intellectual powers are so imperfect that education in the strict sense is excluded, can be trained by manual work to become relatively useful to themselves and to those with whom they are associated. The less heavily handicapped mental defectives often respond to carefully directed and properly planned manual training to a surprising degree. It must be recognized that little can be done to urge into functional activity those cerebral cells whose development has become arrested in early life. It is, however, possible to stimulate the normal cells to functional activity and to coordinated action by training the individual to perform exercises and to undertake constructive work. The therapeutic value of the training depends partly on the physical movements habituating the muscles to act in concert and partly on the psychic effect of the consciousness of achievement. The degree of success that will attend efforts of this kind, will depend largely on the magnitude of the

potential intellect. An idiot is in a hopeless position; a moron with but small mental defect can be rendered almost normal.

Occupational therapy has been found to be of inestimable value in the treatment of certain forms of chronic mental disease, particularly when the disorder is functional and the attacks are of limited duration. It is most valuable for persons with undefined or ill-defined psychasthenic symptoms who seek admission to hospitals for the insane as voluntary boarders. It is essential that the occupation be chosen by the psychiatrist who is aware of the nature of the mental disturbance and of the patient's ability to respond to external stimuli. Not every neurasthenic, psychasthenic or insane patient will respond to the invigorating and health-bringing stimulation of work. Training, vocational or merely emendatory, if applied in suitable conditions and to those capable of responding, may yield the most astounding results. Occupational therapy should be developed in psychiatric practice as well as in orthopædic and general practice. It should be associated with vocational training under favourable circumstances. The gospel of work will come into its own, even if the individual appears to be relatively useless to himself or to the community.

Current Comment.

HYPERCHOLESTEROLÆMIA AND SPLENOMEGALY.

CHOLESTEROL is found wherever fats occur in animal tissues. Although opinion is not unanimous on the subject, most of the evidence tends to show that the human body is dependent on vegetable matter for its cholesterol and it is doubtful whether it can be synthesized in the tissues. Of the importance of cholesterol in the body metabolism there can be no doubt, but information is far from complete as to its ultimate fate, its destruction and elimination. If an excess of cholesterol is administered in the diet, the unused cholesterol is stored in various tissues, notably those of the liver, spleen and suprarenal glands. The normal channel of excretion of cholesterol is probably the bile, for in the bile it is present in its unchanged form and in the form of cholic acid, combined with other substances to form the bile acids. This fact has led to numerous investigations into the part played by cholesterol in gall stone formation. Moynihan claimed that there are two chief factors in gall stone formation, infection and increase in the cholesterol content of the blood. Fowweather and Collinson carried out investigations on patients operated on by Moynihan. They found that the blood cholesterol was raised in 46·7%, the bile cholesterol raised in 44%, the gall bladder cholesterol raised in 45·5%. They found that as a rule the blood cholesterol was raised during the acute stage of gall bladder disease, but fell later. Campbell, on the other hand, concluded after investigating the condition of fifty-two persons that there is no evidence that the formation of gall stones is caused by a raised cholesterol content of the blood and bile. In the normal body both the cholesterol and the bile acids are in part reabsorbed from the intestine, so that there is a tendency for cholesterol and its products to circulate and to accumulate in the tissues. Robertson has pointed out that this process cannot go unchecked, otherwise the accumulations of cholesterol in the tissues would soon extinguish their functional activities. He regards it as possible from the abundance of cholesterol esters in the suprarenal cortex, particularly during cholesterol overfeeding, that the suprarenal glands may play a part in assisting to destroy or eliminate cholesterol. It should be pointed out that in certain animals, rabbits for instance, part of the excess of cholesterol is deposited in the interior of the arterial walls, leading to the formation of lesions which resemble arterio-sclerotic lesions in the arteries of human beings.

Progress in knowledge in regard to the part played by cholesterol in metabolism will be made both by experimental biochemical research and by the study of conditions in which its abnormal distribution has resulted in the production of a pathological lesion. S. C. Dyke has recently reported a case in which subacute pancreatitis, hypertrophic biliary cirrhosis of the liver, icterus, hypercholesterolæmia, xanthoma and splenomegaly were present.[1] The patient was a married woman of forty-one years of age. After she had suffered for some time from irritation of the skin and jaundice, she was submitted to surgical operation. The gall bladder was exposed, but was found to be normal. Subsequently her skin became covered by numerous soft yellowish tumours which produced a picture typical of *xanthoma tuberosum et planum*. The blood plasma was yellowish and contained myriads of minute globules, presumably of fatty substance; the cholesterol content was 1·25 grammes per hundred cubic centimetres. Of this amount 0·22 gramme was present as the ester and the remainder of the cholesterol was unfixed. The Van den Bergh test yielded a biphasic and indirect reaction. After a diagnosis of partial obstruction to the outflow of bile had been made, cholecyst-enterostomy was performed and the patient died. At *post mortem* examination subacute interstitial pancreatitis was found. The liver was affected by moderate biliary cirrhosis. The polygonal cells of the liver appeared to be normal; none contained fat and in none was there

[1] *The Journal of Pathology and Bacteriology*, April, 1928.

any evidence of damage or degeneration. No increase in the Kupffer cells could be detected and none could be seen containing globules of fatty or other material. The macroscopical enlargement of the liver appeared to be due entirely to the round cell infiltration of the biliary canal system. In the spleen which was enlarged almost to the umbilicus, the most striking feature was the presence in the splenic pulp of vast numbers of cells of the endothelial type. These were universally dispersed throughout the splenic pulp of which they constituted the greater portion. These cells were predominantly mononuclear; the cytoplasm was bulky, sometimes clear and sometimes granular, but only in the rarest instances did it manifest the reticular structure of the typical foam cell. Contrary to expectations none of the cells when stained manifested the presence of any fatty substance.

In discussing the condition, Dykes states that the subacute pancreatitis appears to have been of importance only in so far as it produced a partial and possibly intermittent obstruction to the outflow of bile into the duodenum and that any other factor such as the presence of biliary calculi would have been capable of engendering the same syndrome. He evidently believes that any mechanical obstruction to the outflow of bile would initiate a syndrome similar to that which he reports. He ignores two possible factors. In the first place the cause of the pancreatitis in his patient was not determined. It is impossible to be certain that it was not dependent on some error in metabolism which also affected the cholesterol content of the blood. In the second place if obstruction had been due to a biliary calculus, it would be impossible to ignore the conditions which had occasioned the biliary calculus. The work of Moynihan and his associates previously mentioned shows this. Dykes refers to cases similar to his own which were reported by Parkes Weber and he states that the significance of the syndrome seems to have escaped detection. He also refers to a case reported by Futcher in which gall stones were removed and both icterus and xanthoma subsequently disappeared. He points out that the significant common factor is an obstruction to the outflow of bile, leading to the establishment of a chronic icterus. In all cases reported the icterus has been of long standing; the shortest duration was eight months and the longest eight years. The sequence of events is a damming back of the outflow of bile into the duodenum with resulting icterus and hypercholesterolæmia. Dykes states that his is the only case in which the blood cholesterol has been estimated and he draws attention to its high level. It appears that some other factor is necessary for the development of the xanthoma in addition to a high blood cholesterol content; probably in diabetes and icterus the other factor is supplied by the trauma due to pruritus and scratching. Dykes holds that the evidence in favour of these suggestions is entirely presumptive, as figures for the cholesterol content in xanthoma are extremely scanty. The biliary cirrhosis found in the body of his patient is regarded as being due to the damming back of the bile.

The chief interest in Dykes's case centres round the splenomegaly. The presence of the mononuclear cells is regarded as accounting for the enlargement and it also establishes the relationship of the condition reported by the author to splenomegaly of the Gaucher and Niemann types and to that form described by Schultze as occurring in certain cases of diabetic lipæmia. The mononuclear cells of the spleen are obviously part of the reticulo-endothelial system and reference to the part played by this system in hypercholesterolæmia will be found in Woollard's "Listerian Oration," published in this issue. Dykes states that there is much evidence that the spleen in its relationship to cholesterol metabolism acts only as a part of the whole reticulo-endothelial system. He could find no evidence in the cells of globules of cholesterol ester or other fatty substance. In a footnote, a *post scriptum* to his paper, however, he refers to work of Graham and Blacklock who were able by heating to bring about the appearance of doubly refractive material in sections of the spleen from patients with Gaucher's disease. He applied this method to sections from the spleen of his patient. On the third reheating in glycerine definite globules in the cells became visible. Graham and Blacklock suggested that heating brought about the liberation of lipoid material from combination.

Consideration of Dykes's communication will show that he has drawn attention to a syndrome which has not perhaps been recognized before as being a manifestation of irregularity in cholesterol metabolism. He has also emphasized what was already known in regard to the reticulo-endothelial system and cholesterol. The question may well be asked as to why xanthoma and splenomegaly do not occur more frequently. According to Dykes the obstructive jaundice must be present for some time and some additional factor must be present, a factor such as trauma. A bacterial infection might be regarded as supplying the necessary trauma, for example in the gall bladder. A bacterial infection probably gave rise to the pancreatitis which caused the obstruction in Dykes's patient. The part played by the macrophages of the reticulo-endothelial system is important. The prolonged partial blocking of the biliary tract interferes with the removal of cholesterol from the body and the action of the macrophages is part of the body's defence against the abnormal retention of the substance. The enormous power of multiplication of these cells is well known and it is quite justifiable to conclude that Dykes's inability in the first instance to discover cholesterol in the substance of the splenic cells by the ordinary staining methods was due to the effort of the macrophages to break the cholesterol up into simpler substances in an effort to get rid of it. In view of the extraordinary response of the reticulo-endothelial system to hypercholesterolæmia it remains to be proved whether the cells of this system play any part in the disposal of cholesterol in health.

Abstracts from Current Medical Literature.

SURGERY.

Mechanism of Emptying of the Gall Bladder and Common Duct.

G. H. COPHER AND C. ILLINGWORTH (*Surgery, Gynecology and Obstetrics*, April, 1928) discuss their experimental work on the mechanism of the emptying of the gall bladder and common duct. It is partly dependent upon the intrinsic muscular action, partly upon elasticity and partly upon the ebb and flow of fresh bile from the liver. The last factor is of special importance in animals in which the anatomical arrangement of the gall bladder precludes its complete contraction, as in the monkey. Variations in intraabdominal pressure play a minor rôle in the emptying of the gall bladder. Peristaltic contractions of the common duct have been observed in pigeons and it is suggested that they may take part in the flow of the bile in some mammalia. The response of the gall bladder to a fat meal depends upon its absorption through the intestinal wall. It is not proved whether the response of the gall bladder is due to a hormone action or nervous excitation. Sodium iodide is absorbed by the gall bladder wall.

Precancerous Changes in the Rectum and Colon.

LOCKHART MUMMERY AND CLEMENT DUKES (*Surgery, Gynecology and Obstetrics*, May, 1928) describe their investigations at Saint Mark's Hospital into the precancerous changes in the rectum and colon. A difficulty from the clinical standpoint is that the disease is seldom seen, except in the late stages when the growth has already reached a considerable size, for it is not till then that symptoms are produced. In the vast majority of histories of patients with rectal cancer there is nothing pointing to any previous condition which might be a forerunner of the tumour. The earliest recognizable lesion in the development of cancer of the rectum is a hyperplastic change taking the form of irregular epithelial proliferations, scattered over an extensive area of the bowel. This is followed by the appearance of visible tumours, adenomata. These are usually numerous and often separated from each other by several inches of mucous membrane, normal in appearance to the naked eye. This is called the precancerous stage. The bowel may remain in this condition for many years; at any stage in the epithelial proliferations or at any stage in the growth of the adenomata the epithelium may abruptly assume those invasive properties recognized clinically and histologically as cancer. It would appear that carcinoma formation is an accident happening to a previously existing adenoma. With the development and dissemination of the malignant tumour, the neighbouring epithelial proliferations and benign tumours tend to retrogress and disappear, so that they are less evident in association with large malignant ulcers. These opinions are supported by pathological and clinical observations. If this view of the sequence of events is correct, the condition described as multiple adenomata is one that should be watched most carefully. The truth seems to be that adenomata, once removed, do not tend to recur in the same spot, but other adenomata tend to develope in the neighbouring mucous membrane.

Central Fracture Dislocation of the Acetabulum.

E. L. ELIASON AND MURRAY WRIGHT (*Surgery, Gynecology and Obstetrics*, April, 1928) describe their investigations into central dislocation fracture of the acetabulum. Penetrating fracture of the acetabulum with central dislocation of the head of the femur is a distinct entity and not a rarity. It is apparently on the increase because of the onward march of civilization. Associated fractures of the pelvis occur in over 50% of cases. Pelvic and abdominal complications are ever to be borne in mind, anticipated and treated at an early stage. Nerve injuries occur in as high a percentage as thirty-three of affected persons. Careful examinations and due regard to patient's complaints are to be emphasized. Unrecognized fracture dislocations occur too often. Reduction is generally best achieved by anæsthesia, flexion and wide abduction with slight external rotation. Recurrence takes place if immobilization is not properly secured. This is best done, if possible, by a plaster spica to the body, hip and lower extremity placed in abduction, slight flexion and external rotation. The mortality ranges from nil to 50%. Careful and frequent examinations, early treatment of all injuries and observant study will effect a shorter convalescence and increased function.

Hydatid Disease of the Kidney.

GORDON CRAIG AND R. K. LEE-BROWN (*Surgery, Gynecology and Obstetrics*, May, 1928) describe their experience with hydatid disease of the kidney occurring in Australia. Hydatid is a disease of wool growing countries. It takes about fifteen to twenty years from the time of infestation for hydatid disease to manifest itself. There are two types of hydatid of the kidney: (i) the open type which communicates with the renal pelvis and (ii) the closed type which has no communication with the renal pelvis. The diagnosis of the open type is comparatively easy if a full clinical and urological examination is made. The diagnosis of the closed type is difficult and requires the aid of intradermal tests of Casoni or the complement deviation test of Ghedini. Nephrectomy is the most suitable operation in the presence of open hydatids. Marsupialization or nephrostomy after devitalizing the contents of the cyst with alcohol or formalin is the safest and best operation for closed hydatids. Subtotal nephrectomy may prove a useful operation when the function of the other kidney is poor.

The Localization of Brain Tumours.

EGAS MONIZ (*La Presse Médicale*, June 2, 1928) gives details of a new method of localization of cerebral tumours by radiography of the cerebral arteries. After temporary clamping of the internal carotid artery an injection of sodium iodide was made into its commencement and by this method good radiograms were obtained. Owing to the difficulty of injecting the internal carotid, this method was later replaced by temporary clamping of both the external and common carotids and by making the injection into the common carotid artery. A 25% solution of chemically pure sodium iodide at 37° C. is employed, not more than six cubic centimetres should be injected and the injection must be made rapidly. A bradycardia generally occurs immediately after the injection. Forty injections have been given by this method; in patients with cerebral tumour both sides have been injected at intervals of several days under local anæsthesia. Arterio-sclerosis is the only contraindication. In discussing technique, the author insists on the necessity for rapid injection of the solution just at the moment of exposure. The exposure used was one-tenth of a second. The patient is placed with the head horizontal, secured to the table by a bandage, and the line of the eyes must be vertical. Stereoscopic radiograms have been obtained with a six centimetre displacement of the tube. In regard to the reaction of the patient, there are some reactions common to the two techniques (the internal and common carotid artery methods) and others peculiar to the internal carotid method. Most patients manifest no reaction beyond some pain in the head, ear and eye. In others there was a rapid harmless epileptiform seizure which had an unexpected feature in that the clonic spasms were more pronounced or even limited to the side of the injection. These reactions, though common to both techniques, are more common when the internal carotid is injected. Generally after the injections the patients have no discomfort. Papillœdema appears to be ameliorated; this was seen particularly in two instances and the author has even reinforced the arterial injection by intravenous injection of a 20% solution of sodium iodide. Two bad results were observed; in two patients following an epileptiform seizure, more pronounced on the side injected, hemiplegia of the opposite side occurred. These accidents are attributed to impurity of the solution used. Interpretation of the radiographs in some cases offers no difficulty, but more experience of the method is required for a certain diagnosis in all cases. Most information is obtained from the vessels of the

Sylvian fissure; when these are considerably displaced they give a certain diagnosis. The histories of seven patients with the radiograms obtained are given. The author concludes: (i) that injection of sodium iodide, chemically pure, for arterial encephalography is harmless; (ii) that it is necessary to obtain good radiograms for accurate localization and this is not difficult: (iii) that this method gives important diagnostic indications in the localization of cerebral tumours in a large percentage of cases and (iv) that the localizations obtained by this method appear to be quite accurate.

Diathermy Operations for Cancer of the Tongue.

W. DOUGLAS HARMER (*The British Journal of Surgery*, April, 1928) discusses his technique of diathermy operations for cancer of the tongue. Diathermy is an admirable method of treating cancers of the mucous membranes in any of the upper air passages, particularly those that are easily accessible, such as carcinoma of the tongue and the author considers treatment by diathermy to be more satisfactory than treatment by the knife. Chloroform anæsthesia is advisable except for small localized growths, when local anæsthesia may be employed. Preliminary tracheotomy or ligature of the lingual or external carotid arteries is rarely required. When arterial ligature is indicated, the lingual artery is ligated in the floor of the mouth after excision of the growth in the anterior third of the tongue and the external carotid, lingual and facial arteries are ligated after excision of growths in the posterior third. Several methods may be employed. Fulguration is particularly suitable for leucoplakia. Coagulation is suitable for small ulcers on the tongue or floor of the mouth. Coagulation, followed by excision, has given good results, but has been abandoned in favour of the circumvallation method of Howard Kelly which is followed by excision and fulguration of the exposed area; this is probably the best method for the most serious forms of the disease and the safest method of removing a fragment for microscopical examination. The arc operation consists in cutting with the endotherm knife. The monopolar method of Clark is suitable for leucoplakia, ulcers, superficial neoplasms, warts and moles. Radium followed by diathermy has been the method employed during the last three years. Needles containing one milligramme of radium are inserted in and around the growth and left for from four and a half to eight days. If the growth or scar does not entirely disappear within six weeks, the area is excised by diathermy. Eighteen patients have been treated by this method with good results and the method is promising as it is necessary to remove only a small portion of the tongue, with a minimum of mutilation and of subsequent interference with speech. Healing after diathermy is remarkably free from pain and there is less shock and toxæmia and secondary hæmorrhage is less common than after cutting operations. The sloughing that results is harmless. Sepsis rarely occurs and œdema of the neck and floor of the mouth is slight and rapidly disappears. Septic bronchitis and pneumonia are not common. In regard to the glands of the neck, if glands are not palpable and the type of growth (after Broders) is not virulent, it is advised to leave them, but to subject them to frequent examinations. In growths of Grades I and II without glands, radium collar or the use of X rays is advised. If there is a localized enlargement of glands, these should be removed and if there is still any further doubt, radium collar or X rays should be used. If multiple glands are present, especially if they are very adherent, operation is contraindicated. In these circumstances benefit may sometimes be obtained by burying radium seeds or needles, by the use of the radium collar or by X rays. In conclusion, many patients with cancer of the tongue which would be considered inoperable by ordinary methods, can be relieved if not cured by diathermy.

Two-stage Operation for Carcinoma of the Stomach.

DONALD C. BALFOUR (*The Journal of the American Medical Association*, June 16, 1928) points out that occasionally a fixed malignant mass is encountered in the pyloric end of the stomach which has extended into the regional lymphatic glands and is fixed to the pancreas, the duodenum is inflamed and thick walled and the patient is in poor condition because of prolonged starvation resulting from obstruction. In these circumstances a two-stage operation has many advantages over a one-stage operation. It has been customary to do gastro-enterostomy far enough above the growth so that resection can be done in from ten days to two weeks without encroaching on the gastro-enteric stoma. When this is done drainage is not always satisfactory if the stoma is made high up and, if the stoma is placed in the most dependent part of the stomach, resection may be difficult to perform without encroaching on the anastomosis. The author has overcome these difficulties by a two-stage operation. At the first operation he divides the stomach completely above the growth, closing the end of the lower segment and reestablishing continuity either by a retrocolic end-to-side gastro-jejunostomy or an antecolic end-to-side gastro-jejunostomy with entero-anastomosis. At the second operation resection of the growth is performed. The advantages are that the first operation can be done under local anæsthesia; perfect drainage of the stomach is established immediately and the patient can take adequate nourishment without difficulty; the second stage is usually simple, since the pyloric segment is free and can be mobilized quickly and easily. A further advantage is that exclusion of the pyloric segment for a period up to fourteen days lessens the activity of inflammatory processes and makes resection easier. There is also no interruption to the feeding of the patient. The author describes the steps of the operation and these are depicted in several illustrations.

Renal Circulation Following Various Types of Nephrotomy.

CLYDE LEROY DEMING (*The American Journal of Surgery*, April, 1928) has made an experimental study of the renal circulation following various types of nephrotomy. A series of the following types of incision was made: longitudinal section in Broedel's line; transverse incision over the convex border of the kidney; transverse extension of a pyelotomy incision to the lower pole in the midline; direct incision over the thin area containing the calculus. The sutures used in these experiments were Number "00" twenty-day catgut and ten-day catgut. The experiments were carried out on dogs. In the complete longitudinal incision the best results were obtained from mattress sutures placed close to the edge of the wound from cortex to pelvis and back on the same side and then tied across to a similar suture on the other side. Much damage was done if the sutures were placed as much as five millimetres from the incision. Deep sutures tied over the convex surface caused less damage than mattress sutures. Results of the transverse incision were variable. When a transverse elongated pyelotomy is made, little damage is done to the kidney. Extension of a pyelotomy incision in the midline to the lower pole gave excellent exposure and healing was ideal. The author concludes that suture of the kidney is of great importance after incision, but the best nephrotomy is that carried out by the longitudinal incision through Broedel's line, ligation of the retropelvic vessels causes renal damage and the best method of elongating a pyelotomy wound is towards the lower pole in the midline.

Injection of Blood for Post-operative Complications.

H. SIEGENFELD (*Wiener Medizinische Wochenschrift*, March 17, 1928) refers to the prophylactic and therapeutic value of injections of whole blood for all post-operative pulmonary complications. For the past five years in his clinic there has been a 30% mortality among patients who had an anæsthetic of more than forty-five minutes' duration. He then gave to all patients operated on a prophylactic injection of twenty cubic centimetres of fresh blood taken from a vein and injected intramuscularly. Eleven out of one hundred and ten such patients developed pulmonary complications and two died. Better results were obtained when the injections were used as treatment after the development of pneumonia. The author considers that the injections have most effect if given as soon as the pneumonia has been diagnosed.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Melbourne Hospital on May 16, 1928. The meeting took the form of a series of demonstrations by members of the Melbourne Hospital Clinical Society.

Pernicious Anæmia.

DR. KONRAD HILLER presented two patients suffering from pernicious anæmia associated with subacute combined degeneration of the cord. Both had been treated by intensive liver feeding and small doses of dilute hydrochloric acid and both showed definite improvement in the blood condition and some improvement in the complication of the nervous system.

The first patient was a widow, *ætatis* fifty-seven, who had been admitted on March 6, 1928, with the history that twelve months previously she had developed a sore mouth and tongue and had become gradually weaker with anorexia and loss of weight. Six months before the meeting numbness and tingling had first begun in the feet and later in the hands. A month later walking had become difficult and this had rapidly become worse. At the time of admission she had been unable to walk. One month previously she had been unable to hold objects in her hands and finer movements could not be performed. A week before admission loss of control over the rectal and bladder sphincters had developed.

On admission her mentality had been distinctly impaired. Speech had been hesitant and slow and comprehension dull. She had been suspicious and irritable, so that complete investigation by fractional test meal *et cetera* could not be made. The general examination revealed some degree of bronchitis, no cardiac abnormality and some enlargement of the liver downwards. Her urine was normal.

Blood examination showed red blood cells 1,200,000, white cells 4,000, hæmoglobin 55%, colour index 2. There was marked anisocytosis and poikilocytosis, macrocytes were fairly numerous and occasional megaloblasts were present.

Examination of the central nervous system had revealed the cranial nerves to be normal. There had been some loss of power in the arms and legs and definite ataxia had been present. The biceps and triceps jerks had been active and equal, the knee and ankle jerks excessive but equal. There had been bilateral patellar and ankle clonus and an extensor type of plantar reflex on both sides. The superficial abdominal reflexes had not been obtained. Joint muscle and bone vibration senses had been absent, deep sensibility had been impaired and diminished sensation to cotton wool in both legs up to the groins and in the forearms had been present. Other sensations had not been affected. There had been ataxia of the hands and legs. At first liver treatment had been resented and badly borne. Some diarrhœa had developed, but this had gradually improved. Several blood examinations had been made.

On March 18, 1928, the findings had been as follows:

Erythrocytes, per cubic millimetre ..	1,240,000
Hæmoglobin value	50%
Colour index	2·0
Leucocytes, per cubic millimetre	3,000

Some macrocytosis and poikilocytosis had still been present.

On March 26, 1928, the findings had been:

Erythrocytes, per cubic millimetre ..	1,800,000
Hæmoglobin value	55%
Colour index	1·8

On March 31, 1928, the findings had been:

Erythrocytes, per cubic millimetre ..	2,400,000
Hæmoglobin value	55%
Colour index	0·9

The film had been almost normal.

On April 10, 1928, the findings had been:

Erythrocytes, per cubic millimetre ..	2,800,000
Hæmoglobin value	60%
Colour index	0·9

On April 28, 1928, the findings had been:

Erythrocytes, per cubic millimetre ..	3,000,000
Hæmoglobin value	60%
Colour index	1·8

On June 13, 1928, the findings had been:

Erythrocytes, per cubic millimetre ..	4,000,000
Hæmoglobin value	70%
Colour index	1·1

The film had been quite normal and no reaction had occurred to the Wassermann test.

Simultaneously with the improvement of the state of the blood, the patient's general and mental condition had manifested a distinct return to normal. The lower limbs in the earlier stages of treatment had become more paresed and there had appeared superadded tenderness of muscles. The jerks had become less active and Babinski's sign had been more difficult to demonstrate. Other sensory phenomena had remained unchanged.

It was suggested that a peripheral neuritis had been superimposed on the spinal lesions. In the upper extremity there had been distinct improvement. Ataxia had become much less apparent and finer movements were comparatively easily performed.

Dr. Hiller's second patient was a female, single, *ætatis* sixty-five, who had been admitted on March 12, 1928. She had complained that twelve months previously she suffered from an intermittently sore tongue. Six months later she had noticed increasing tiredness and weakness. Two months later numbness and tingling had developed in hands and feet. One month before admission she had become weak in the legs and walking had been difficult. She had suffered from attacks of diarrhœa about six months previously. There had been no loss of control over bladder and rectum. There had been a loss of 12·6 kilograms (two stone) in weight in twelve months.

There had been little of note in the general examination, but examination of the nervous system had shown that the mentality was good and the cranial nerves were normal. Arm movement had been good and power fair. The movements of the legs had been ataxic. Some loss of power in the thigh muscles, less in the muscles of the calf, had been noted. The knee and ankle jerks had been absent. The plantar response had been doubtful. Babinski's reflex and the superficial abdominal reflexes had been absent. The biceps and triceps jerks had been active and equal. There had been loss of joint and muscle sense in the lower extremities and bone vibration sense had been absent in the right leg and diminished in the left. The other sensations had been normal.

Blood examination had revealed 3,000,000 red corpuscles per cubic millimetre, 7,000 leucocytes per cubic millimetre, a hæmoglobin value of 55% and a colour index of 0·9. Macrocytosis and anicocytosis had been present. Some megaloblasts had been seen, but no normoblasts.

No free hydrochloric acid had been found on test meal examination and the Wassermann test had yielded no reaction. There had been no reaction of degeneration in the muscles of the legs.

An X ray examination of the lumbar region had revealed spondylitis of the lumbar vertebræ and definite patchy sclerosis of the fifth lumbar vertebra with right-sided collapse, also some chronic changes about the bones of the lower part of the pelvis possibly localized *osteitis deformans* or possibly metastatic malignant deposits. The rest of the vertebræ were normal.

The patient had been put on 226 grammes (half a pound) of mammalian liver a day. The result, as seen in subsequent blood examination, was as follows:

On March 31, 1928, 2,800,000 erythrocytes per cubic millimetre, hæmoglobin value 55%, colour index 0·9.

On April 11, 1928, 3,300,000 erythrocytes per cubic millimetre, hæmoglobin value 65%, colour index 0·9.

On April 25, 1928, 4,000,000 erythrocytes per cubic millimetre.

On May 5, 1928, 4,600,000 erythrocytes per cubic millimetre, hæmoglobin value 65%, colour index 0·7. The stained film had had a normal appearance.

The patient had regained some power in her legs so that she could walk with a little assistance.

In spite of the X ray findings, Dr. Hiller adhered to the diagnosis of pernicious anæmia with combined degeneration of the cord as the symptoms, findings and improvement could not be reconciled with a pressure lesion at the fifth lumbar vertebra.

Cerebral Injury.

MR. B. T. ZWAR showed a motor mechanic, aged twenty-seven, who had been admitted on April 15, 1928. He had been involved in a motor car accident about one hour previously in which he was thrown out of the car and rendered temporarily unconscious. On inquiry into his previous history it had been discovered that he had suffered from paralysis of the left leg and foot since birth. His mother and father were alive. The patient was the second of three living in the family. His mother had had four miscarriages, one premature birth and one still-born child. Two miscarriages and a premature birth had occurred between the birth of the eldest child and the birth of the patient. On examination it had been discovered that the patient was conscious, quite rational, but much shocked. Profuse bleeding had occurred from a large scalp wound extending across the occipital region. There had been no bleeding from the ears or nose. Examination of his central nervous system had indicated that his cranial nerves were normal. Both biceps and both triceps jerks had been equal and active. His right knee jerks had been present and his right plantar reaction flexor in type. The superficial abdominal reflexes had been equal and active. The left leg and foot were deformed. The blood pressure had been 95 millimetres of mercury and it had not risen above 136 subsequently. During that day he had been restless. No twitchings or spasms had been observed. At 5 p.m. a right lower facial paresis had been noticed together with right hypoglossal paresis in the right arm and flaccid paralysis. Movements at wrist and fingers had still been present. Spastic paralysis had been present in the right leg. Examination of his reflexes had shown that his right biceps jerk was greater than his left, that the right triceps jerk was greater than his left and his right knee and ankle jerks were hyperactive, that his right plantar reflex was extensor in type and his right superficial abdominal reflex was absent and that his left superficial abdominal reflex was present. Lumbar puncture had been performed and the cerebro-spinal fluid which was clear, had not been under increased pressure. It had contained a few red blood corpuscles. On April 16 the right facial paresis had increased and the right arm was completely paralysed except the fingers. The right leg had been completely paralysed. On April 17 there had been complete right facial arm and leg paralysis. Examination of the ocular fundi had revealed no abnormality. There had been no venous engorgement or sign of venous stasis. X ray examination had revealed nothing abnormal. Because of the absence of signs indicating increased intracranial pressure and the normal character of cerebro-spinal fluid, the cause of the paralysis was considered to be subcortical and the decision was against operation.

Multiple Aneurysms of the Thoracic Aorta.

DR. S. O. COWEN showed a male patient, *ætatis* fifty-seven, who had been admitted to the out-patient department on April 26, 1928. He had complained of paroxysmal cough, shortness of breath and præcordial pain for the previous eighteen months. These symptoms had come on suddenly when he was lifting a heavy weight. At first they had been elicited only by moderate exercise, but for the previous twelve months the slightest exertion had sufficed to bring them on. The paroxysms of cough lasted for varying times from a few minutes to half an hour; for the most part the cough had been unproductive but on occasion a little blood-streaked phlegm had been brought up. The shortness of breath and pain had occurred only on slight exertion or following the bouts of coughing; there had been no orthopnœa. The pain had been of a dull, aching character; it had commenced in the left hypochondrium and had radiated across to the region of the right nipple. No œdema of the feet had been noticed at any time, nor had the patient been aware of any change in his voice. His general nutrition had remained unaffected.

Dr. Pennington, who had attended him in the out-patient department, had at once suspected the presence of an aneurysm and had been able to confirm this diagnosis by the physical findings. The heart had been found to be enlarged downwards and to the left; there had been dulness extending two finger-breadths to the right of the sternum in the second interspace; the second sound at the aortic cartilage had been accentuated and thumping; a tracheal tug had been present and the signs over the upper lobe of the right lung had been suggestive of compression of the lung. The patient had therefore been admitted to hospital with a provisional diagnosis of aneurysm of the aorta. Further examination had revealed, in addition to the above signs, dulness in the left interscapular region where the heart sounds had been faintly audible and diminished vesicular murmur had been heard over the upper half of the left lung. It had therefore been suggested that the aneurysm was situated at the commencement of the descending thoracic aorta and that the physical signs noted anteriorly were due to a simple rather than an aneurysmal dilatation of the ascending aorta. The problem had been submitted to the arbitrament of the radiologist who reported: "Marked general dilatation throughout arch of aorta with aneurysmal dilatation of arch displacing trachea well to right and a second aneurysmal dilatation of descending aorta; less aeration of left lung than right." Further investigations had shown that response of the blood serum to the Wassermann test was strongly positive and that movements of the vocal cords, on phonation and respiration, were normal.

Dr. Cowen considered that the chief points of interest raised by the features of the case were: the strongly suggestive, almost diagnostic, history; the puzzling physical signs, explicable only by the presence of more than one aneurysm; the unusual X ray picture; and the problem of treatment. As regards this last, he proposed to enforce strict rest and to continue with the administration of iodide by mouth and mercury inunctions which had been instituted when the patient was first seen. After six or eight weeks of this *régime* the question of administering bismuth intramuscularly would be considered and, in all probability, a series of injections of very small doses would be given. Dr. Cowen was of the opinion that the extent of the lesion contraindicated the use of organic arsenicals owing to the dangers of a fatal Jarisch-Herxheimer reaction and of the "therapeutic paradox" of increase in the pressure signs as a result of too rapid reparative processes.

Gas-containing Hydatid Cyst of Liver.

Dr. Cowen's second patient was a young man, aged twenty-one years, who had been admitted to hospital eight weeks previously. His main complaint was of abdominal pain which had been continuous for nine weeks; the pain had been generalized and subject to frequent exacerbations of colicky type; it had not been accompanied by nausea or vomiting. Several similar attacks of pain had occurred during the previous seven years. The patient had lost 3·15 kilograms (half a stone) in weight since the onset of this attack, but had been otherwise in fair general condition.

On examination great bulging of the lower part of the chest on both sides had been noted. The abdomen had been swollen and its upper part had been hard and resistant, but no definite outline of the tumour could be determined. On the left side the upper level of liver dulness had appeared to be a little higher than normal. On the right side dulness had extended as high as the third rib except between the nipple and the sternum where there was, with the patient in the recumbent position, an area of hyperresonance extending from just above the costal margin to the third rib. On making the patient sit up, the dulness had changed and had extended as high as the fourth rib. A succussion splash had been elicited over this area of movable dulness. There had been no jaundice. The Casoni test yielded an "intermediate" response and the hydatid complement fixation test no response. The X ray report had been as follows: "Right side of diaphragm has a very limited excursion and is much raised generally. Gas below diaphragm, then a fluid level about one inch below top of dome. Possibly subphrenic hydatid."

The diagnosis had been much disputed. As against that of hydatid had been the indefinite response to the Casoni test, the size of the swelling and the absence of gross

evidences of suppuration. For the first week after admission the patient's temperature had remained below normal; but later continuous fever up to 38·3° C. (101° F.) had developed. The white blood cells had numbered 9,500 per cubic millimetre and no excess of eosinophile cells had been found. The only alternative diagnosis had been that of subphrenic abscess to which the same objections applied with equal force.

At operation five weeks previously Mr. Lambert had opened an hydatid cyst containing 4·5 litres (eight pints) of purulent fluid and many degenerate daughter cysts. Drainage (by resection of a portion of the fifth rib in the anterior axillary line) had been satisfactory, no complications had occurred and the patient had made steady progress. Cultures of the cyst contents had yielded a growth of a gas-forming coliform organism. Two weeks after operation the hydatid complement fixation test had again yielded no reaction.

Dr. Cowen discussed especially the difficulty of the diagnosis in the absence of frank evidences of a suppurative process and more definite serological reactions. The difficulty had been accentuated by the size of the cyst and the presence of gas within it. Further problems and probably more puzzling ones might arise during the subsequent treatment, but they would be more concerned with the surgical management of the case which he was not competent to discuss.

Paroxysmal Tachycardia Terminating in Auricular Fibrillation.

DR. LESLIE HURLEY showed a woman, aged forty-six years, who had been admitted to the out-patient department on May 21, 1927, complaining that for the previous twenty-six years she had been having attacks of rapid heart action. Each attack was of quite sudden onset and termination and at its termination she noticed a pause followed by a "thump." Latterly the attacks had been more frequent and prolonged and had been accompanied by some shortness of breath. On examination the pulse rate had been 76 and apart from slight cardiac enlargement and a systolic blood pressure of 160 millimetres of mercury, nothing abnormal had been detected.

On June 2, 1927, the pulse rate had been 150, but during examination it had suddenly dropped to 76, the patient being quite aware of the sudden change in rate. An electrocardiogram, taken on the same day, showed a normal rhythm.

On August 13, 1927, the pulse rate had again been 150 and the patient had said that it had been so for the previous month. Vagal pressure had had no effect on the rate. Digitalis in full doses had been tried, but without result. Quinidine 0·2 gramme, given three times daily, had then been tried, but the pulse rate had remained unaltered. The patient had become considerably short of breath and somewhat cyanosed, the attack having lasted for about three months. She had been admitted as an in-patient and with rest she had rapidly improved, although the pulse had still remained rapid. Quinidine 0·3 gramme had been given intravenously, but the pulse rate had not altered. Tracings, taken during this period, had revealed an auricular tachycardia.

In January, 1928, the pulse had become irregular and a clinical diagnosis of auricular fibrillation had been confirmed by an electrocardiogram. It had been found that digitalis controlled the pulse rate, but not so satisfactorily as in most cases of fibrillation. The auricular fibrillation had persisted and the patient had been fairly comfortable while taking digitalis. The points of interest were: (i) The failure of vagal pressure and the intravenous use of quinidine; (ii) the small amount of distress after over three months of tachycardia; (iii) the termination in auricular fibrillation.

Exophthalmic Goître Without Thyreoid Enlargement or Exophthalmos.

Dr. Hurley also showed a man, aged thirty-three years, who had been admitted to the out-patient department on April 20, 1928. He had been operated on twenty-six years previously for hydatid of the liver. During the previous six months he had lost 25·2 kilograms (four stone) in weight, his appetite had increased, he had sweated very freely and had become very nervous. On being questioned he had said that he did not feel the cold and slept with only one blanket even on a cold night. He had also been under treatment at the Eye and Ear Hospital for multiple corneal ulcers. On examination the pulse rate had been 140 and the skin warm and moist. The systolic blood pressure had been 160 millimetres of mercury and the diastolic pressure 80 millimetres. The urine on several examinations had contained no sugar. No signs of tuberculosis had been detected in the lungs and a skiagram of the chest had revealed nothing abnormal.

On April 30, 1928, the basal metabolic rate had been +35% and on May 4, 1928, it had been +30%. There had been no fever. The palpebral aperture on the right side had been noticed to be slightly wider than on the left.

Dr. Hurley drew attention to the following points of interest: (i) The absence of thyreoid enlargement and exophthalmos; (ii) the high pulse pressure; (iii) the significance of loss of weight combined with increased appetite and tolerance to cold; (iv) the absence of shortness of breath, despite prolonged tachycardia; (v) the absence of response to the Casoni test.

Disseminated Sclerosis.

Dr. Hurley also showed a woman, aged thirty-nine years. Fifteen years previously she had had an attack of blindness lasting several months. Ten years previously she had had a transient attack of numbness and weakness in both arms. Four years previously she had been admitted as an in-patient, complaining of stiffness and weakness in both lower limbs. At that time the plantar reflexes had been extensor, the superficial abdominal reflexes absent and both nystagmus and intention tremor had been present. On account of the stiffness and weakness in the legs she had been unable to walk for over twelve months.

In the previous four years she had had three courses of "Arseno-benzol" and had been taking mercury and iodides intermittently. She had had no further remissions and her condition had steadily improved. She was able to walk quite well and the only positive phenomena were absent superficial abdominal reflexes and extensor plantar reflexes, although she occasionally complained of attacks of numbness and tingling in various parts of the body. At times nystagmus and intention tremor were present and there was slight cerebellar ataxia with very slight spasticity in the gait.

The points of interest were: (i) The long duration in what appeared to be a typical case of disseminated sclerosis, (ii) the possible benefit resulting from anti-syphilitic treatment.

Auricular Fibrillation.

Doctor Hurley's fourth patient had suffered from auricular fibrillation for six years without any symptoms; the heart beat had been restored to normal rhythm after administration of quinidine. The patient, a man, aged thirty years, had been admitted to the out-patient department in December, 1926, complaining that for the previous six years the pulse had been irregular. There had been no other symptoms. On examination the pulse had been quite irregular and the clinical diagnosis of auricular fibrillation had been confirmed by the electro-cardiogram. There had been very slight tremor, but no exophthalmos. The arteries had been slightly thickened. The *fundi oculi* had been healthy. The urinary examination had revealed nothing abnormal. The urea concentration test had yielded a figure of 3·1%.

On May 3, 1927, the patient had been admitted as an in-patient. Dr. Hurley had given 0·2 gramme of quinidine and on the following day had ordered 0·4 gramme every four hours day and night. After the fifth dose the pulse had suddenly become regular and the patient had noticed the alteration in rhythm. The quinidine had been gradually reduced over a period of three weeks and the patient was still taking 0·2 gramme every day. The systolic blood pressure was 150 millimetres of mercury and the diastolic 80 millimetres. Although he had no symptoms other than the irregularity the patient said that he felt better now that the pulse was regular. An electrocardiogram taken on May 9, 1927, revealed normal rhythm.

The points of interest were: (i) The long duration of fibrillation without symptoms, (ii) the absence of any discoverable cause, (iii) the mode of administration of the quinidine.

Syphilitic Neuritis.

Dr. Hurley's fifth patient suffered from what had been diagnosed as probably syphilitic neuritis. He was a man, aged sixty-eight years, and had been admitted to the out-patient department on March 30, 1928. The family history was good. For the previous two or three years he had had attacks of severe pain with also numbness and tingling in the right little finger, the ulnar side of the ring finger and along the ulnar border of the hand and wrist. He had also noticed weakness of the right hand, particularly in buttoning his clothes, cutting his tobacco and opposing the thumb to the fingers.

On examination there had been leukoplakia on the inner aspects of both cheeks. The knee jerks had been almost absent. There had been thin papery scars on the leg with pigmented margins. The systolic blood pressure had been 190 millimetres of mercury and the diastolic 105 millimetres. The arteries had been thickened and impairment of sensation had been noted over the area affected by pain and numbness. The right ulnar nerve had been tender and there had been weakness of the hand grip in the ulnar fingers and considerable weakness in opposing the thumb to the fingers. The Wassermann test had yielded no reaction on two occasions. X ray examination for a cervical rib had previously been carried out and nothing abnormal had been found. Under antisyphilitic treatment there had been fairly rapid improvement.

The points of interest were: (i) The prompt improvement after only a short period of antisyphilitic treatment (mercury and iodides for five weeks and one injection of 0·2 gramme of "Novarsenobenzol"); (ii) the absence of response to the Wassermann test in the presence of clinical signs suggesting syphilis.

Chronic Lymphatic Leuchæmia.

Dr. Hurley's last patient was a man, aged seventy years, who had been admitted to the out-patient department on March 24, 1928. Four years previously he had complained of epigastric pain and his doctor had found that his spleen was enlarged. Three or four months later he had begun to feel very tired and weak and had started to lose weight; he had lost 25·2 kilograms (four stone) in the previous four years.

On examination he had looked pale and appeared to have lost weight. The spleen had been palpable 2·5 centimetres (one inch) below the level of the umbilicus, the axillary and inguinal glands had been moderately enlarged and the liver edge had been felt three finger-breadths below the costal margin. A blood examination had yielded the following information:

Erythrocytes, per cubic millimetre ..	3,300,000
Hæmoglobin value	60%
Colour index	0·9
Leucocytes, per cubic millimetre ..	200,000

The blood film had shown a typical picture of chronic lymphatic leuchæmia:

Lymphoblasts	25%
Lymphocytes	29%
Polymorphonuclear cells	2%
Degenerated cells	44%

The patient had been given a mixture containing 0·18 mil (three minims) of *liquour arsenicalis* which had been gradually increased and had had three deep X ray exposures to the spleen. He felt and looked considerably better, but the spleen had not diminished very much in size.

The points of interest were: (i) The comparatively slow progress during the four years before the patient attended hospital; (ii) the improvement under X ray therapy, although there had been very little diminution in the size of the spleen.

Swellings for Diagnosis.

DR. W. W. S. JOHNSTON presented three patients with swellings in the neck for differential diagnosis.

The first, W.H., a male, aged sixty-two years, was thought to have an aneurysm of the left common carotid artery. He had first been seen twelve months previously on account of swelling of the left side of the neck, varying in size for the previous six months. There had been considerable loss of weight and strength.

The main findings on examination at the time of presentation were as follows: The patient's face was pale and thin, his pulse was collapsing, his heart was not enlarged. At the aortic area could be heard a systolic and a faint short diastolic bruit. In the neck there was a pulsating, but not definitely expansile, swelling, involving a considerable portion of the left side of the neck. No tremor and no exophthalmos were present. Examination of his larynx had revealed nothing abnormal. His systolic blood pressure was 148 and the diastolic 80 millimetres of mercury. In the Wassermann test there had been a well marked deviation of complement (strong positive).

His basal metabolic rate had been as high as +22% and when last estimated in August, 1927, had been +7%.

X ray examination on April 4, 1928, had revealed a mass extending from above the arch of the aorta into the left side of the neck with a pulsatile, rounded, right lateral margin displacing the trachea and the œsophagus well to the right. The swelling had suggested aneurysm of the left subclavian or left common carotid artery.

At first, taking the view that the swelling was due to enlargement of the left lateral lobe of the thyreoid gland and the condition one of myxœdema with compensatory hypertrophy of the thyreoid gland, Dr. Johnston had given the patient thyreoid substance by the mouth. But since the result of the Wassermann test and the X ray finding, the condition had been regarded as an aneurysm and he was being treated on antisyphilitic lines, but progressive heart failure was becoming manifest.

In the discussion that arose, the opinion was generally expressed that the swelling was due to the thyreoid gland and that the evidence in favour of aneurysm was not conclusive.

Dr. Johnston's second patient was a male, aged sixty years, with an aneurysm of the innominate artery. He had reported for treatment recently on account of pain in the back of his head, in the right side of his neck up to his ear and in the right shoulder. The pain was worse at night.

Examination revealed a pulsating expansile swelling, the size of a small walnut, just above the right sterno-clavicular joint. His heart was slightly enlarged. In his lungs some rhonchi were heard in the right upper lobe.

In the Wassermann test his serum caused a deviation of complement (strong positive). His blood pressure was 160 (systolic) and 76 (diastolic) millimetres of mercury in the right arm and in the left 160 and 70 respectively. Radiological examination had been carried out and a general dilatation of the aortic arch with a pulsatile and expansile shadow extending upwards and to the right from the arch had been found. Aneurysm of the innominate artery had been diagnosed.

The diagnosis in this case seemed clearly established and left little room for discussion.

Dr. Johnston's third patient was Mrs. B., aged fifty-eight years, who was thought to have an aneurysm of the right subclavian artery. She had been first examined on October 3, 1927, when she had been admitted at once to hospital on account of uræmia.

On examination at the meeting she had a small pulsatile swelling above the middle of the right clavicle. Her heart was enlarged and her arteries sclerosed. On the right and left sides respectively her blood pressure was 214 (systolic) and 134 (diastolic) and 212 (systolic) and 136 (diastolic) millimetres of mercury.

Her urine contained albumin and granular casts. Her blood serum had failed to deviate complement in the Wassermann test. The radiologist had reported general aortic widening with projection of the arch to the left and a little enlargement of the heart shadow to the left.

The patient had been under treatment with potassium iodide and the size of the swelling appeared to have decreased during the previous two months.

During the discussion the opinion was expressed that the swelling might be caused by an unusually tortuous subclavian artery. This view was supported by the decrease in size of the swelling and the absence of response to the Wassermann test.

Disease of the Biliary Passages.

MR. ALAN NEWTON showed a series of patients who had suffered from disease of the biliary passages and who had been operated upon by him in the Melbourne Hospital in 1927. The total number of persons subjected to operation in this period had been thirty-one, six male and twenty-five female. Four of these persons were in the third decade, nine in the fourth decade, seven in the fifth, seven in the sixth and four in the seventh decade. Nine patients had suffered from cholecystitis without stones. In two of these the gall bladder had contained pus and in the remainder varying degrees of cholecystitis had been found. Seventeen persons had suffered from stones in the gall bladder only. In four an acute empyema of the gall bladder had been found and in one there was a fistula from the gall bladder to the duodenum. In two patients stones had been found in the gall bladder and in the common duct. In two persons stones had been found in the common duct, but no stones had been found in the gall bladder which, however, was diseased. In these instances the stones had obviously migrated from the gall bladder to the duct. One patient had had her gall bladder drained twelve years previously. She had suffered from a recurrence. Cholecystectomy had been performed elsewhere seven years previously and a recurrence had taken place in the common duct.

In the thirty-one patients certain associated diseases had been found: three patients had suffered from duodenal ulcer, two from diabetes and one patient from severe chronic interstitial pancreatitis.

In regard to anæsthesia ethylene had been used in nine operations and ether in twenty-two.

As far as the operations were concerned, the gall bladders of thirty patients had been removed. In the patient with severe chronic pancreatitis the gall bladder had been drained so that it would be available if complete obstruction of the common duct should occur at a later date. The common duct had been drained in five instances. It had not been opened as a routine. In the patients with duodenal ulcer, a posterior gastro-jejunostomy had been performed. The appendix had been removed in twenty-one instances. It had not been sought for in persons suffering from acute gall bladder disease. The appendix of four persons had been removed at an earlier operation.

As far as the results were concerned, Mr. Newton said that only one patient had died. This patient was a woman, aged sixty years, a diabetic, who suffered from acute gall bladder disease. She had died in thirty-six hours from cholæmia. At *post mortem* examination extreme fatty degeneration of the liver had been found, no post-operative hæmorrhage had occurred and no injury to the ducts had been discovered. All patients were instructed to write a report on their birthdays. Good reports had been received from twenty-nine. One instance of recurrence of pain was being investigated. All the patients had been asked to write to or attend on the night of the meeting.

(To be continued.)

Obituary.

WILLIAM ARTHUR JAMES.

DR. WILLIAM ARTHUR JAMES, of 56, Cotham Road, Kew, Victoria, died in a private hospital on June 20, 1928, after a brief illness, at the age of fifty-four years. He was the son of the late Hosea James, a grazier with large holdings at Emu Plains, Queensland, who came to Australia in 1852.

William Arthur James was educated at King's College, Fitzroy. He was *dux* of every class in the school and finally *dux* and captain of the school.

He entered the Melbourne University in 1892 and graduated in medicine and surgery in 1897. In his final year he secured honours in all subjects with first class honours, the exhibition and the Beaney Scholarship in surgery. He represented the University in cricket and football and played for the first eleven against Sydney University.

After graduation William Arthur James was appointed Resident Medical Officer at the Melbourne Hospital and later served as Honorary Surgeon to Out-patients at the Melbourne Hospital and Honorary Physician to Out-patients at the Children's Hospital.

He commenced practice at Williamstown and was there for two years, filling the position of Honorary Surgeon to the Williamstown Hospital and acting as assistant to the late A. E. V. Honman. Later he was associated with Dr. R. A. Stirling as medical referee to the Australian Mutual Provident Society in Melbourne and was medical officer to the firm of Dalgety and Company. He was for many years demonstrator and lecturer to the dental students at the Melbourne University in oral surgery.

In 1904 James moved to Kew where he established a large practice till he died. He was particularly interested in surgery and practised as a general surgeon in Collins Street for twenty years.

He took the higher degrees of doctor of medicine and master of surgery in 1903 and 1904 respectively and for some time sat as a member of the Senate of the Melbourne University.

William Arthur James served in the Boer War as a lieutenant in the Australian Army Medical Corps. On his return from South Africa he joined the Royal Australian Navy and at the time of his death was a Surgeon-Commander on the retired list.

On the outbreak of the Great War he went to Rabaul as Consulting Surgeon on the hospital ship *Grantala*. On his return from German New Guinea he was retained in Australia for the remaining years of the war as an examining officer.

William Arthur James was always a very busy man and lived quietly in his private life. He was a collector of precious stones and postage stamps. He was an original member of the University Club and a Past Master of the University Masonic Lodge.

No member of the medical profession Melbourne stood higher in the esteem of his colleagues and of the public than William Arthur James. His ability, his integrity and his high ideals were recognized by all and to those who knew him personally, there was conveyed a sense of fineness of character which fitted and explained his long record of good work.

He leaves a widow and two daughters and two sons, the elder of whom is studying medicine at the Melbourne University.

Doctor R. A. Stirling writes:

I first knew Dr. W. A. James as my House Surgeon at the Melbourne Hospital, when he showed unusual capacity for his work, and I formed thus early a very high opinion of him. In 1903 he passed the M.S. examination, Colonel Bird and myself being the examiners.

Later on he was temporarily appointed Surgeon to the Out-patient Department at the Melbourne Hospital, and I have afterwards wondered why his claims for reappointment were overlooked.

For many years, in association with the late Doctor Embley he assisted me in my private work. One could not fail to be impressed by his skill and care and, above all, by that conscientious devotion to duty which was so marked a feature of every phase of his life.

In later years it was the more remarkable in view of the impairment of health which resulted from his naval service during the Great War.

Doctor James was beloved by all his patients and a wide circle of friends, and very deep sympathy will be felt with his widow and young family. His untimely death is indeed a loss to the community.

Dr. H. M. Hewlett writes:

By the untimely death of William Arthur James I have lost a life-long friend and the medical profession a most capable member. He always had a leaning for surgery and his brilliant academic course and his hospital appoint-

ments laid the foundation stones for his future surgical work. He was keen and untiring in acquiring surgical knowledge and skill and his work with the late Dr. Honman and his long association with Dr. Stirling were factors which strongly influenced his career. Efficiency and thoroughness were outstanding qualities of his work. His friendship was always loyal and sincere and no one ever brought him a problem without receiving sound advice. He will be greatly missed by a large circle of friends as he was most hospitable and entertaining, and great sympathy will be extended to his wife and family.

TRANSMISSION OF BACTERIOLOGICAL AND PATHOLOGICAL SPECIMENS BY POST.

THE Acting Secretary of the Postmaster-General's Department has requested us to call the attention of the medical profession to the amended rules that were introduced on July 1, 1928, in regard to the transmission of bacteriological and pathological specimens by post, if addressed by registered medical practitioners or veterinary surgeons to registered laboratories. The amended rules have been framed for the convenience of medical practitioners. Specimens may be sent by ordinary letter or packet post, provided that the rules are obeyed in their entirety. Medical practitioners are urged to pay particular attention to the wording of the rules in regard to packing and endorsement. The following are the amended rules.

AUSTRALIAN POST OFFICE RULES.

Operating as from July 1, 1928.

The following conditions as to packing and posting must be observed in respect of all bacteriological or pathological specimens sent by post to an address within the Commonwealth:

(1) An article containing any bacteriological or pathological specimen will not be accepted for transmission, or, if found in the post, will not be delivered unless addressed to a laboratory which has been registered by the Postmaster-General.

(2) The following is a list of the laboratories which have been registered:

Institution *et cetera.*	Place.
Department of Public Health ..	Sydney, New South Wales.
Dr. A. E. Finckh	Sydney, New South Wales.
Dr. W. K. Inglis	Sydney, New South Wales.
Dr. A. H. Tebbutt	Sydney New South Wales.
Dr. F. Tidswell	Sydney, New South Wales.
Dr. L. Utz	Sydney, New South Wales.
Dr. C. J. Wiley	Sydney, New South Wales.
Dr. Ethel Byrne	Newcastle, New South Wales.
Prince of Wales Hospital	Randwick, New South Wales.
Dr. Andrew Brenan	Melbourne, Victoria.
Dr. D. G. Bull	Melbourne, Victoria.
Dr. C. H. Mellison	Melbourne, Victoria.
Melbourne University (Pathological Laboratory)	Melbourne, Victoria.
Walter and Eliza Hall Institute for Research, Melbourne Hospital	Melbourne, Victoria.
St. Vincent's Hospital (Pathological Department), Dr. Andrew Brenan	Melbourne, Victoria.
Dr. W. A. T. Lind, Hospital for Insane	Kew or Royal Park, Victoria.
Dr. D. Thomas	Richmond, Victoria.
Commonwealth Serum Laboratories	Royal Park, Victoria.
Dr. M. W. Ratz	St. Kilda, Victoria.
Bacteriological Laboratory, Department of Public Health	Brisbane, Queensland.
Laboratory, Hospital for Sick Children	Brisbane, Queensland.
Dr. W. Sidney Page	Brisbane, Queensland.
Australian Institute of Tropical Medicine—Director, Dr. A. Breinl	Townsville, Queensland.
Government Veterinary Surgeon ..	Townsville, Queensland.
Queensland Stock Experiment Stations	Townsville and Yerongpilly, Queensland.
Adelaide Clinical Research Laboratory	Adelaide, South Australia.
Elder Laboratory, Adelaide Children's Hospital	Adelaide, South Australia.
South Australian Government Laboratory of Pathology and Bacteriology, Adelaide Hospital	Adelaide, South Australia.
Laboratory, State Public Health Department	Perth, Western Australia.
Dr. E. S. Morris, Director of Public Health	Hobart, Tasmania.
The Hookworm Campaign Laboratories	Wherever Field Units are operating in Australia or its Dependencies (*e.g.* "The Hookworm Campaign, Mackay, Queensland").
Newcastle Hospital	Newcastle, New South Wales.
Repatriation General Hospital ..	Caulfield, Victoria.
Dr. Reginald Webster, Children's Hospital	Carlton, Victoria.
Dr. E. Russell Butchart	63, Shannon Avenue, Newtown, Geelong, Victoria.
Dr. Marjory Little	139, Macquarie Street, Sydney, New South Wales.
Veterinary Research Station ..	Glenfield, New South Wales.

(3) The liquid or substance forwarded for examination must be enclosed in a receptacle hermetically sealed, which receptacle must itself be placed in a strong wooden or metal case, in such a way that it cannot shift about, and with a sufficient quantity of some absorbent material (such as sawdust or cotton wool) so packed about the receptacle as absolutely to prevent any possible leakage from the package in the event of damage to the receptacle.

(4) The article must not be sent by parcel post, and, except as provided in paragraphs (5) and (6), the article must be registered and not dropped into a letter box. Any article of the kind found in the parcel post or any article of the kind, whether registered or not, found in the post, not packed as directed, will be deemed to be posted in contravention of the *Post and Telegraph Act* and dealt with accordingly.

(5) In the case of throat swabs which are not obtained in time to permit the sender to hand the article in at a post office for registration, owing to the post office having closed for the day, such specimens may be transmitted by ordinary post, provided they are properly packed in accordance with paragraph (3), and the article bears an endorsement by the sender that the specimen enclosed was obtained too late to permit the sender to hand the article in at a post office for registration.

(6) Bacteriological and pathological specimens posted by duly qualified medical practitioners and duly qualified veterinary surgeons may be sent by ordinary post, provided that the rules as to packing as prescribed herein are rigidly adhered to, and that the outside of the postal article is endorsed by the sender with the words "Specimen for Bacteriological or Pathological Examination—Packed as Prescribed," followed by the sender's signature and the usual abbreviation indicating that the sender is a qualified medical practitioner or veterinary surgeon.

(7) Except in cases mentioned in paragraph (5), specimens posted by persons other than medical practitioners or veterinary surgeons must be transmitted by registered post and must be endorsed "Specimen for Bacteriological or Pathological Examination."

In the case of specimens addressed to places beyond the Commonwealth, except as provided in the latter portion of this paragraph, they are transmissible only if rendered harmless by their mode of preparation and packing. Pathological specimens addressed to the General Superintendent, Imperial Cancer Research Fund, London, and sent by duly qualified medical practitioners or veterinary surgeons or by recognized pathological or related scientific laboratories, may, if securely packed in tubes enclosed in wooden cases, be forwarded by sample post.

Any person who sends by post bacteriological or pathological specimens otherwise than in accordance with the conditions governing the transmission of these articles shall be guilty of an offence. Penalty: Fifty pounds.

Books Received.

THE CLINICAL EXAMINATION OF THE LUNGS, by E. M. Brockbank, M.D. (Victoria), F.R.C.P., and Albert Ramsbottom, M.D. (Victoria), F.R.C.P.; Second Edition, 1928. London: H. K. Lewis and Company, Limited. Crown 8vo., pp. 125, with illustrations. Price: 5s. net.

THE SENSORY AND MOTOR DISORDERS OF THE HEART: THEIR NATURE AND TREATMENT, by Alexander Blackhall-Morison, M.D., F.R.C.P.; Second Edition, 1928. Baillière, Tindall and Cox. Demy 8vo., pp. 372, with illustrations. Price: 18s. net.

AIDS TO EMBRYOLOGY, by Richard H. Hunter, M.D., M.Ch.; 1928. London: Baillière, Tindall and Cox. Foolscap 8vo., pp. 168, with illustrations. Price: 3s. 6d. net.

AIDS TO PUBLIC HEALTH, by W. G. Aitchison Robertson, M.D., D.Sc., F.R.C.P.E., Barrister-at-Law; Second Edition, 1928. London: Baillière, Tindall and Cox. Foolscap 8vo., pp. 192. Price: 3s. 6d. net.

HOW TO KEEP YOUNG, by Edwin Wooton; 1928. London: William Heinemann (Medical Books) Limited. Crown 8vo., pp. 127. Price: 3s. 6d. net.

CATECHISM SERIES: PHYSICS, Part I; Third Edition, 1928. Edinburgh: E. and S. Livingstone. Crown 8vo., pp. 73. Price: 1s. 6d. net.

Diary for the Month.

AUG. 7 and 8.—Federal Committee of the B.M.A. in Australia.
AUG. 7.—Tasmanian Branch, B.M.A.: Council.
AUG. 9.—Victorian Branch, B.M.A.: Council.
AUG. 9.—New South Wales Branch, B.M.A.: Clinical Meeting.
AUG. 10.—Central Southern Medical Association, New South Wales.
AUG. 10.—Queensland Branch, B.M.A.: Council.
AUG. 14.—Tasmanian Branch, B.M.A.: Branch.
AUG. 14.—New South Wales Branch, B.M.A.: Ethics Committee.
AUG. 15.—Western Australian Branch, B.M.A.: Branch.
AUG. 15.—Central Northern Medical Association, New South Wales.
AUG. 17.—Eastern District Medical Association, New South Wales.
AUG. 20.—New South Wales Branch, B.M.A.: Organization and Science Committee.
AUG. 21.—Tasmanian Branch, B.M.A.: Council.
AUG. 21.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
AUG. 22.—Victorian Branch, B.M.A.: Council.
AUG. 24.—Queensland Branch, B.M.A.: Council.
AUG. 28.—Illawarra Suburbs Medical Association, New South Wales.
AUG. 28.—New South Wales Branch, B.M.A.: Medical Politics Committee.
AUG. 30.—New South Wales Branch, B.M.A.: Branch.
AUG. 30.—South Australian Branch, B.M.A.: Branch.

Medical Appointments.

Dr. Murray Ian Creagh Mackerras (B.M.A.) has been appointed Assistant Microbiologist, Office of the Director-General of Public Health, Sydney.

* * * *

Dr. Alexander Lionel Caselberg (B.M.A.) has been appointed Government Medical Officer at Barcaldine, Queensland.

* * * *

Dr. Edgar Free (B.M.A.) has been appointed Government Medical Officer at Cooroy, Queensland.

* * * *

Dr. Joseph Schwartz Barr-David (B.M.A.) has been appointed Acting Government Medical Officer at Thursday Island.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xx.

ROCKHAMPTON HOSPITALS BOARD: General Medical Superintendent.

THE BRISBANE AND SOUTH COAST HOSPITALS BOARD: Clinical Assistant.

THE PUBLIC SERVICE BOARD, NEW SOUTH WALES: Director, Medical Officer (Male).

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. Marrickville United Friendly Societies' Dispensary. People's Prudential Benefit Society. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Members accepting appointments as medical officers of country hospitals in Queensland are advised to submit a copy of their agreement to the Council before signing. Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Contract Practice Appointments in South Australia. Booleroo Centre Medical Club.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Medical practitioners are requested not to apply for appointments to position at the Hobart General Hospital, Tasmania, without first having communicated with the Editor of THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor." THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, Sydney. (Telephones: MW 2651-2.)

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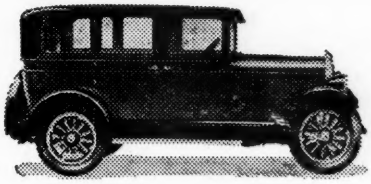

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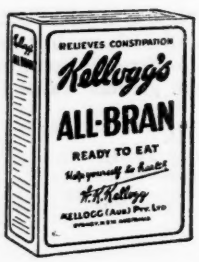

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Index to Advertisements

	Page.
AGENTS—	
British Medical Hall Co., Ltd.	xvi
Goyder, Orr & Co.	xvi
Headley, L. Seymour	xvii
Jefferson, Ellis	xvii
Little, James	xviii
Medical Agency (Medical Society of Victoria)	xvi
Payne, A. P.	xvii
Thomson, Richard, & Co.	xvii
BANKS, TRUSTEES, INSURANCE, ETC.—	
Commonwealth Bank of Australia	xix
CHEMISTS, CHEMICALS, ETC.—	
Bayer Products, Ltd.	xxi
Carnrick, G. W., & Co.	ix
Ciba Products	vii
Deshell Laboratories, Inc.	xxii
Fellows Medical Manufacturing Co., Inc.	vi
Ferris & Co., Ltd.	xviii
Hallam Ltd.	xvii
Hoffmann-La Roche	xix
Musson, G. F. W. ("Muthanol")	xviii
Nathan, Joseph, & Co., Ltd. ("Ostelin")	ix
Oppenheimer, Son & Co., Ltd.	xiii
Prestre, W., & Co. ("Tricalcine")	xi
Schering's Products	vi
CLOTHING—	
Peapes & Co., Ltd.	ii
EXCURSIONS—	
Canadian Pacific Railways	x
FOODS, ETC.—	
Allen & Hanburys (Australasia), Ltd.	i
Arnott's Biscuits	xii
Horlick's Malted Milk	xi
Kellogg (Aust.) Pty., Ltd.	iv
HOSPITALS, ETC.—	
Glenferrie-Lynton	xviii
Sydney Sanitarium	xviii
INSTRUMENTS, ETC.—	
Foy & Gibson	xiii
Francis, H., & Co.	xix
Lamson Store Service Co., Ltd.	xiii
Ramsay, Reaby, Pty., Ltd.	xviii
Selby, H. B., & Co.	xvii
MISCELLANEOUS—	
Abdulla Cigarettes	xvii
London School of Tropical Hygiene	xvi
Longreach Oil Wells, Ltd.	xx
Medical Correspondence College	xvii
MOTOR CARS, TYRES, OILS, ETC.—	
Chrysler Cars	iii
Studebaker Corporation	v
PUBLISHERS—	
Ramsay, W.	xviii
SERA AND VACCINES—	
Commonwealth Serum Laboratories	xv
WINES, ETC.—	
Hennessy's Brandy	viii
Resch's, Ltd.	vii
X RAY APPARATUS—	
Gloria Light Co.	xiv
Radium Bureau	xvi
Watson, W., & Sons, Ltd.	xi

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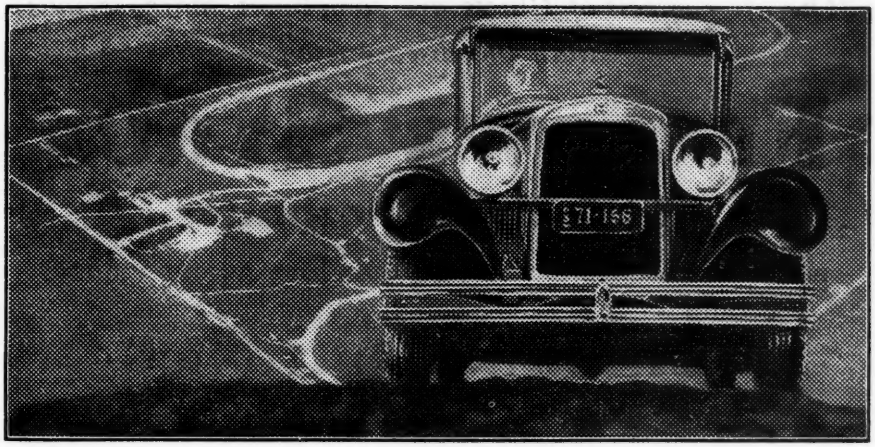

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